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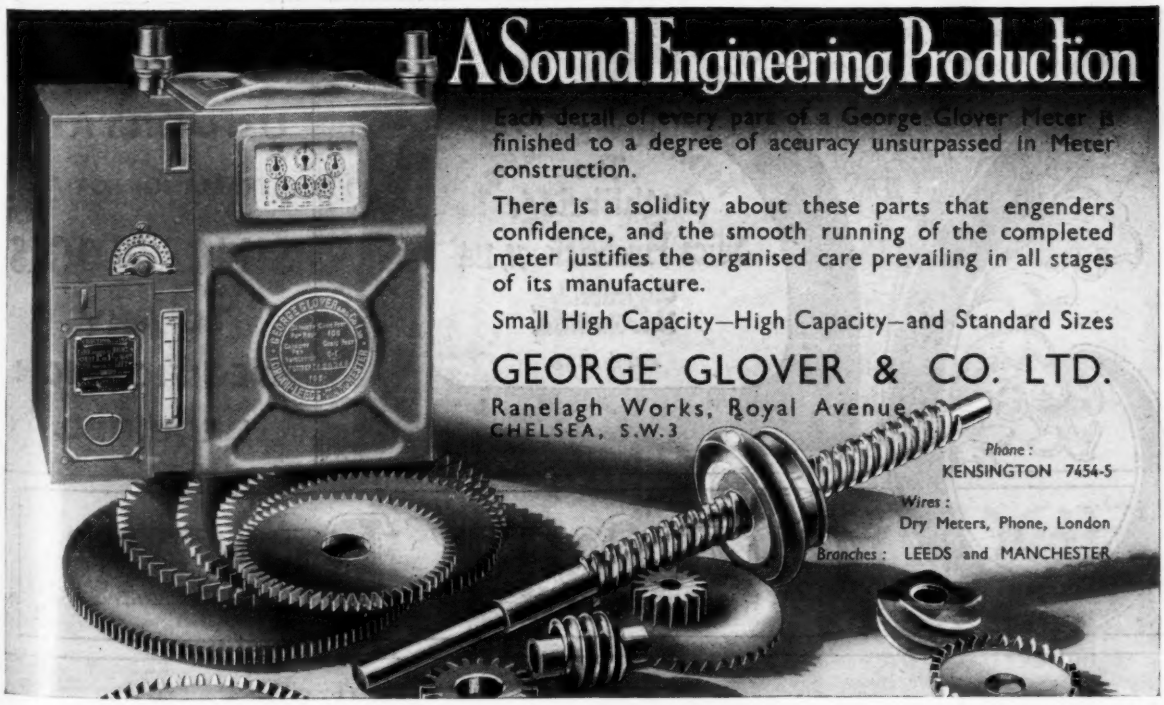

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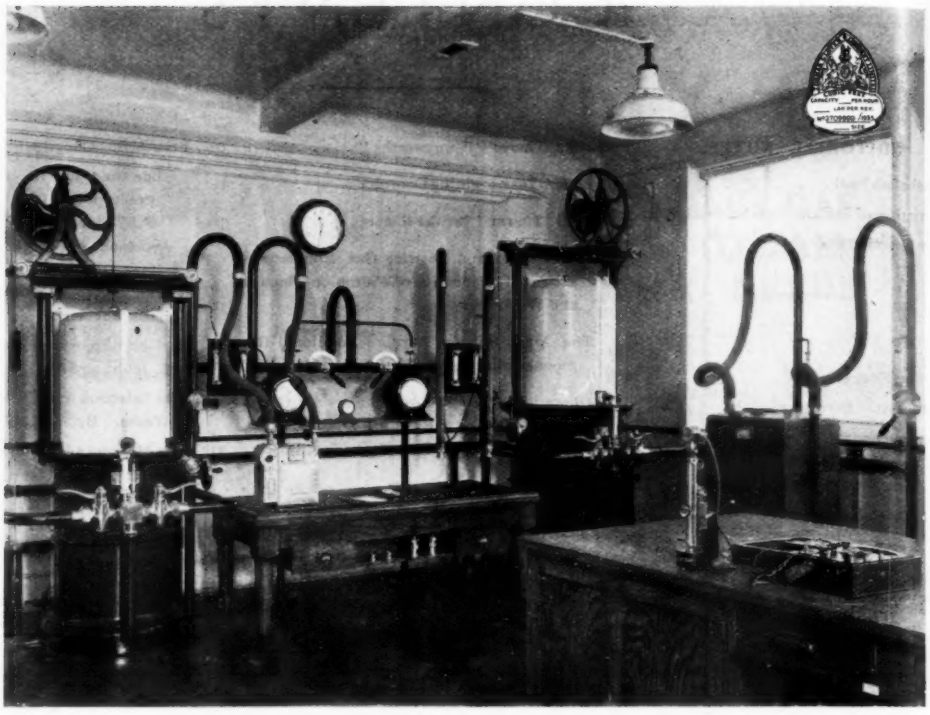

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Gas Journal

AUGUST 7, 1935

Vol. 211. 87th Year No. 3768

Editorial Notes

Solid Smokeless Fuel

Last week we discussed at some length the question of low-temperature carbonization in particular relation to the suggestion in the House of Lords by the Duke of Montrose that the Government should in effect subsidize the production of solid smokeless fuel by this means, and also in connection with the First Report of the "Oil from Coal" Committee of the Scottish National Development Council. We said: "We thoroughly appreciate the Gas Industry's point of view that, from a gas-making aspect, its present process is the most remunerative when regarded in terms of per unit of gas sold. This idea, however, should not be allowed to eclipse another way of looking at the operations of a gas-works, which is simply to consider the annual net profit on the sale of smokeless fuels, both gaseous and solid. If the sale of solid smokeless fuel shows an adequate profit, it does not seem to matter to us what amount of gas is produced or how it is credited in the balance-sheet. That is, of course, if the Industry wishes to be a complete smokeless fuel industry."

In connection with such thoughts as these, we very seriously suggest that our Industry should watch closely what is taking place in connection with low-temperature carbonization, and be prepared, if and when it appears advantageous, to add to its present processes some modified carbonization system—not necessarily low-temperature—to supply a likely demand for a smokeless solid fuel other than high-temperature coke. In practically every discussion, whether inside or outside the House, on the proper treatment of coal to prevent waste and abolish smoke, there is a complete absence of any mention of the extremely valuable rôle which the Gas Industry plays in this respect. This state of affairs must be remedied; the voice of the Industry must be loud enough to be heard when any aspect of carbonization is under review. Definitely there is a move, and a strong and growing one, towards smokelessness; and we regard seriously the lack of public interest taken in the sterling work of the Gas Industry, and the lack of appreciation of the fact that the Industry has for more than a century done vastly more in this direction than any other industry; and that it is better fitted to-day than ever before to produce smokeless fuel in either gaseous or solid form.

Right now we ought to ask ourselves a few questions—and supply the answers. For instance, why has low-temperature carbonization such a popular appeal, and why have its sponsors such a "pull" on public platforms? Is there a demand for the type of fuel produced by the process? Has hydrogenation-cracking put a new face on the economics of the process? If there is a demand, is the Gas Industry going to tell the public that it has no right to ask for what it wants and is ready to pay for? We may be taking an exaggerated view, but we think that unless the Industry watches its paces carefully it may be left on the quayside regretfully watching the ship of *additional* business recede. At the moment, of course, comparatively little low-temperature fuel is being made, but what is being produced is being absorbed by the public at "luxury prices." And week by week we hear of the erection of carbonization plants which have no connection whatever with the Gas Industry.

We make no suggestion that our Industry, in a spirit of alarm, should suddenly start operating fantastic low-temperature schemes. What we do suggest, however, is that if we do not do everything in our power to meet, as we easily can with the resources now at our command, the growing demand for solid smokeless fuel—or fuels—we shall be letting things go by default. We are professional carbonizers, not amateurs, and we ought to have wholehearted public support and the eyes and ears of the politicians. As a great fuel industry we have got to develop the smokeless solid fuel market in order to cheapen the price of gas and make it more universally available, and in developing this market we must keep our finger on the pulse of public demand. Even to-day there are gas undertakings which are not worrying in the least about the preparation of coke—its ash and moisture contents, its sizing, its uniformity. It is a policy detrimental not only to themselves but to the whole Industry. It is certainly not a policy to give life to the slogan "You want cheap gas; we have it."

There is also the need for creating a bigger demand for high-temperature coke which, properly prepared, and burned in special grates fitted with gas ignition, has the

threefold virtue of economy, convenience, and smokelessness. The London and Counties Coke Association has done a great deal of valuable work in developing the coke grate, and it is a first-class business proposition for gas undertakings generally to take advantage of this work. So long as the attitude remains that coke is in competition with gas, we are helping the sale of electricity. Gas undertakings should cater with equal enthusiasm for the coke market and the gas market, offering equal facilities by way of hire purchase, and so on, for the installation of appliances.

The Restriction of Ribbon Development Bill

THIS Bill, the object of which is to prevent ribbon development on the main thoroughfares of the country, has been one of the principal measures before Parliament this Session, and few will quarrel with the general objects which it has in view. As to the merits of the Bill, it is not the function of the "JOURNAL" to enquire; it is merely our task to call attention to the effect which its provisions will have upon gas undertakers.

To have a clear understanding, however, it must be stated that the powers conferred upon Highway Authorities by the Bill are twofold, and they may be briefly summarized as follows. Firstly, to prescribe with the consent of the Minister a standard width which may vary between 60 and 160 ft. Where a standard width is prescribed no means of access to or from the road may be constructed, and no building may be erected or permanent excavation made nearer to the middle of the road than a distance equal to one-half of the standard width adopted, without the consent of the Highway Authority. With regard to this power which applies only to land within the standard width, it is satisfactory to note that the interests of public utilities are protected. The Act provides that the rights of statutory undertakers for gas to make excavations for the purpose of laying, &c., mains and pipes shall not be affected, and that any land specifically authorized by Parliament to be used by such undertakers for the manufacture, distribution, or storage of gas shall not, except in so far as the undertakers consent thereto, be affected; but that such consent shall not be unreasonably withheld. Where a statutory undertaker refused to give consent, it would be for the Highway Authority to prove that such a refusal was unreasonable, the ultimate decision being with the Minister.

With regard to the provision of means of access to or from the highway, the Act provides that the Highway Authority shall not unreasonably withhold consent or make such consent subject to unreasonable conditions.

The second power conferred upon Highway Authorities relates to land 220 ft. from the middle of the road, and provides that no building shall be erected upon this land without the consent of the Highway Authority. With regard to excavations and the use of land specifically authorized by Parliament, the protection given to statutory gas undertakers in connection with the first section of powers described above will apply also in this case. With regard to land belonging to statutory undertakers but not specifically authorized by Parliament for gas purposes, or to non-statutory undertakers, the Highway Authority are not entitled unreasonably to withhold consent to the erection of buildings thereon or to make such consent subject to unreasonable conditions. In this case it would be for the gas undertakers to show that the consent was unreasonably withheld or that any conditions attached thereto were unreasonable.

The Bill gives certain rights to Highway Authorities to acquire land compulsorily for road purposes. It is provided, however, that this right of compulsory purchase is not to apply to land which has been acquired by statutory gas undertakers for the purposes of their undertaking. To this general exemption from compulsory purchase the Bill contains two exceptions in that it permits of the acquisition by order of a right upon, under, or over land of statutory undertakers (*a*) for the purposes of the construction of any bridge upon, under, or over such land; or (*b*) for the purposes of any system of road drainage. Such a right can, however, only be acquired subject to such conditions as the Minister after consultation with the statutory undertakers may consider necessary for securing that the bridge and approaches thereto or the road drainage system, as the case may be, to be constructed will be so designed, constructed, and placed as to avoid unreasonable interference with the functions and future development of the statutory undertakers. Gas undertakers will also be entitled to receive from the Highway Authority any additional expense incurred in the alteration of works or apparatus which is due to the construction of a bridge and system of road drainage.

Although the Bill is by no means easy to understand and its construction may at times give rise to difficulty, we believe that, owing to the amendments which have been secured in Committee, gas undertakers need have no fear that the powers conferred upon Highway Authorities will prove detrimental to their business.

Voluntary Associations

HAVING ourselves always been in favour of the utmost freedom of the subject that may be compatible with the public good, it is a satisfaction to us to note the remark of a Committee of the Federation of British Industries (appointed to consider the principles underlying the various schemes for industrial reorganization which have recently been put forward) to the effect that there are few occasions where the voluntary association is unable to provide the necessary basis of co-operation in industry to-day. We all know broadly what is the alternative voluntary association, though doubt must exist as to the precise form which this alternative would take. It is too much to hope that the politicians will not be always with us, but we do believe, with the Committee, that the objectives of industrial organization ought to be aimed at entirely free from any aspect of political partisanship, and that consideration should be confined to the economic issues involved. But these "economic issues" have to be judged broadly. "There is need for the individual to subordinate his views to those of the industry for the achievement of a common policy, and for co-operation between industries on a scale that pre-war conditions did not so insistently demand. Public considerations to-day place upon each industry a collective responsibility for efficient and economic production."

So far as the Gas Industry is concerned, there is to be found in it ample support for the Committee's assertion that the existing organization of industry in this country in its effects upon those engaged in it or upon the consumer compares favourably with that of other countries; and we must see to it that this position is maintained. For many years past employers and employed in the Gas Industry have worked amicably side by side, bound by that loyalty to agreement which is the only basis upon which voluntary organization can continue to thrive, and the public to receive the service that it has the right to expect. The Committee,

of course, were considering their subject from a more comprehensive standpoint, but we may be forgiven for the reference to our own industry which their report induces. From their broad standpoint, they regard the existing organization of industry as incomplete to meet present-day problems, and feel it is essential that voluntary associations should be extended to cover far greater ground than is the case to-day. In that way, they say the advantages of individual enterprise and responsibility would be retained. This is in line with our own desire that every avenue of " voluntary association " should be explored before resorting to compulsion.

We are also with the Committee in their recognition of the necessity of retaining the advantages of individual enterprise and responsibility. This is to acknowledge the vital importance of leadership. As the Committee point out, industry is not merely a matter of systems. " The system must be a sound one, but the success of an industry or of an individual firm depends above all upon the quality of the direction. Too much importance may be attached to machinery, and too little to leadership. In industry there is no standing still. The problems to be dealt with are never static, but constantly changing."

Personal

After forty-six years' service with the Commercial Gas Company, Mr. SYDNEY MADDOCKS, Registrar of the Company and Secretary of the Co-Partnership and of the Approved Society, is to retire.

* * *

After many years at Cannock, where he has held the position of Secretary to the Cannock and District Gas Company since 1899, Mr. T. A. NICHOLLS is now retiring. Mr. Nicholls was educated at Barrow-in-Furness, and continued his training in the chemical laboratory of the Barrow Steel Company.

* * *

We learn that Mr. E. A. C. CHAMBERLAIN, B.Sc.(Lond.), A.R.C.S., D.I.C., whose tenure of the Company's Gas Research Fellowship, Imperial College of Science and Technology, South Kensington, normally expires on Sept. 30 next, has been appointed to the Fellowship for a further year from that date.

* * *

Princess Marie Louise, attended by Miss Du Cane, was present at the marriage on July 30 at St. Clement Danes, Strand, of Mr. Ambrose Christian Congreve, only child of Mr. and Lady Irene Congreve, of Mount Congreve, Waterford, Ireland, and Miss Margaret (Marjorie) Gholson Glasgow, only child of Mr. and Mrs. Arthur Graham Glasgow. Mrs. Glasgow later held a reception at Moncorvo House, Ennismore Gardens, S.W. 7.

Forthcoming Engagements

August.

13.—IRISH ASSOCIATION.—Annual Meeting, Jury's Hotel, Dublin.

Sept.

5.—B.C.G.A.—Yorkshire District Conference at Bradford.

9-12.—ASSOCIATION OF PUBLIC LIGHTING ENGINEERS.—Twelfth Annual Meeting and Conference in London.

12.—NORTH BRITISH ASSOCIATION.—Annual Meeting at St. Andrews.

19.—WALES AND MONMOUTHSHIRE ASSOCIATION.—Autumn Meeting at Porthcawl.

19.—S.B.G.I.—Council Meeting at 11 a.m.

28-Oct. 1.—B.C.G.A.—Annual General Meeting and Conference at Edinburgh.

N.B.—There will be no meeting of the Central Executive Board of the National Gas Council or of the Central Committee of the Federation of Gas Employers during the month of August.

1935 "JOURNAL" DIRECTORY

Page 14. CANNOCK. T. A. Nicholls, S., retired.

Page 66. TENBY. The declared C.V. as from Oct. 1, 1935, will be 560 B.Th.U.

Page 82. DOUGLAS. T. Stewart, M., resigned.

Page 84. EYEMOUTH. T. Stewart appointed M. vice J. P. Thompson.

Page 84. INVERKEITHING. Miss Colman appointed S. vice R. Baxter deceased.

Page 86. KINROSS. D. R. Young appointed S. vice R. S Young.

Page 90. NEWPORT (Dundee), J. F. Black, M., deceased.

Correspondence

Thirty-Five Years Behind the Times

SIR,—I have been a reader of the " GAS JOURNAL " for more years than I care to remember, and have always been an admirer of its " up to dateness," but I have caught you napping this week.

In your general news items you state that we are increasing our price of gas, but not without opposition, but all this occurred not recently but *thirty-five years ago.*

There is a popular feature in our local paper called " Thirty-five Years ago," giving the chief news of that time, and it is from this column that your information has been taken.

Yours, &c.,
JOSEPH T. BROUGHTON,
Engineer and Manager.

Haslingden Union Gas Company,
Aug. 5, 1935.

[With apologies to Mr. Broughton, we gladly share with our readers a laugh at the Rip van Winkleism of a local correspondent.—ED., G.J.]

Organizations in the Gas Industry

SIR,—It has come to my ears that certain persons (*not* Mr. Boon) rather took to heart a remark that I made, in my criticism of Mr. Boon's Paper, sounding a warning against the danger of too many organizations in the Gas Industry. There was another Paper read at the June Meeting in which additional organizations were mooted, and my remarks were not intended as an attack on any *existing* organizations, which are all doing excellent work. I did, however, intend to try to make some people think before launching *more* ships.

Yours, &c.,
F. W. J. BELTON.

The Berners Hotel, W. 1,
July, 1935.

Chester to Raise New Capital

Chester United Gas Company has passed resolutions to raise £56,080 in new capital. Sir John Frost, who presided at the meeting at which the appropriate resolutions were passed, said the Company's annual make of gas had gone up from 380 million cu.ft. to over 470 million, and the number of consumers of gas from ten thousand to fifteen thousand. Such growth called for additional capital, both for further expenditure on new mains and for enlarging the capacity of the manufacturing plant. The present horizontal retort house needed renewal and the Directors had decided to replace it with vertical retort plant of slightly larger capacity. Among the considerations which had led to this decision was the fact that the Works site could not be extended owing to being bounded by the railway and the river. Vertical retorts would occupy much less space than the old horizontal retorts, and there would be ground left for further extensions when necessary.

The new vertical retort plant, which is of the very latest type, is now being erected by the Woodall-Duckham Company, Ltd. It is to be completed by October next. It will be followed by the renewal and enlargement of other plant at the Works. The total costs involved amount to over £80,000. Of the amount to be expended at the Works a portion only will be charged to capital, the rest coming from reserve.

News in Brief

Morecambe Showrooms.—The Morecambe Gas Committee are to convert the former Council offices in Morecambe Street into showrooms, at a total cost of £1,900.

Ten Gas-Ignited Coke Fires are to be installed as a trial in houses under the first slum clearance order for Stalybridge as a result of careful investigation by the Housing Committee responsible for the clearance.

An Assistant to the Controller of Sales and Service is required by the Manchester Gas Department at a commencing salary of £505 per annum. Further particulars are to be found in the advertisement columns of this week's issue.

Applications are Invited for the position of Sales Manager by the Folkestone Gas and Coke Company. Further particulars of the position which carries a salary of £400 per annum will be found in the advertisement columns of this week's "JOURNAL."

A Reduction of 2d. per 1,000 cu.ft. in the price of gas was decided by the Glasgow Gas Committee on Aug. 2. It was reported that the surplus on the Undertaking for the past financial year was £65,350, while the surplus estimated for the current year was £51,130.

Dividends for the half-year ended June 30 last have been decided upon by the Directors of the East Surrey Gas Company at the following rates per annum respectively: 6% on the cumulative preference; 4½% on the redeemable preference; 5½% on the preference "A"; and 6% on the ordinary "B" stock, all less income-tax.

To Bring the Advantages of compressed gas in place of petrol as a fuel for commercial motor vehicles to the notice of gas-works authorities and users of such vehicles, the recently formed French Comité pour le Developpement des Gaz Comprimés has lately despatched from Paris two motor lorries so equipped on a tour of the principal towns of France.

Small Irish Undertakings and Coal.—In the Free State Legislature last week Senator Dowdall withdrew an amendment he had tabled to the Finance Bill proposing that the first two thousand tons of coal sold to gas-works should be exempt from the emergency duty of 5s. per ton. The object of the amendment was to endeavour to relieve the small gas-works in provincial towns of the burden, but the Government intimated that it could not be accepted.

A Beautifully Illustrated Booklet describing their new Works at Roche Maurice, Nantes, which were officially inaugurated on June 29 last, has been kindly sent to us by the European Gas Company. The construction of this Works was begun in 1931 and they now replace the old Works at the Quai des Tanneurs. The design of the new Works permits of large future extensions and incorporates plant of the latest type. Carbonization is carried out in intermittent vertical chambers for 12-hour periods with 2 hours' steaming.

Work Has Been Started with the construction of a battery of 59 coke ovens at Messrs. Strakers & Love & Co.'s colliery at Brancepeth. The contract has been placed with the Woodall-Duckham Company. The colliery company has obtained a contract to supply gas to Darlington Corporation which will involve the laying of a main between Darlington and Brancepeth Colliery, a distance of about 18 miles. The new battery will be capable of carbonizing 1,000 tons of coal a day and the development is the largest in the South Durham coal area for several years. Coke production will begin in about 12 months' time.

On the Invitation of the Gas and Water Committee, members and officials of the Widnes Town Council and their wives visited the Gas-Works, fire station, reservoir at Bexhill, and the pumping stations at Stocks Well, Netherley, and Belle Vale on July 24. The Gas and Water Engineer, Mr. C. E. Dickinson, explained interesting points and Councillor J. Williams during tea said one of the questions which had recently come to the fore was the expansion of gas consumption. Since the inauguration of the showrooms in Albert Road eight years ago the Committee had sold over £65,000 worth of gas apparatus of various kinds.

The Final Scheme for the new headquarters of the Liverpool Gas Company, to be erected in Bold Street, Liverpool, has now been approved, and demolition work is to begin immediately. The projected scheme is on such a scale that it is expected that it will be two years before all the commercial staff of the Gas Company will be able to remove to their new headquarters, for, in addition to the offices, it is understood that the building will contain a lecture hall for cookery demonstrations, cinema shows, and educational purposes; a staff kitchen available as a model for all large and small scale catering, and a domestic information bureau.

Amalgamation and Grouping

Severn Valley and Wem.

The Severn Valley Gas Corporation announced on Aug. 2 that their recent offer to shareholders of the Wem Gas Light and Coke Company, Ltd., has been accepted by the holders of a substantial majority of the issued share capital of that Company.

A Live Carnival Entry

Third prize was taken in the local carnival by this fine entry of the Hereford Corporation Gas Department. It was a truly "live" entry, for the geyser and sink heaters at the back of the driver's cabin were actually at work, being supplied with "bottled" gas from cylinders supplied by the Birmingham Gas Department.

"Mr. Therm's Pennyworths"

"You know what a therm of gas costs you. This booklet tells you what a therm of gas will do for you." In a nutshell, these two sentences sum up the object with which the B.C.G.A. have published the latest addition to their vast range of publicity literature—"Mr. Therm's Pennyworths."

The appeal of the booklet is obvious. Every housewife, with any pretensions to the title, will make each penny go as far as is economically sound. It is not the amount of gas that she burns that worries her so much as the amount of work that gas will do for her. Sunny ubiquitous Mr. Therm sets her mind absolutely at rest on that question. He gets right down to brass tacks on the first page by pointing out that "a penny saved is just a penny gained. But a penny put through the gas meter buys clean, healthy warmth; speedy cooking; instant hot water; easier washdays; pleasant, unfailing light." Use is made of diagrammatic sketches to good effect, and a casual glance through the contents conveys a great deal to the reader. This quality is, of course, essential to the success of such a publication. Showroom managers will find the publication a very useful addition to their literature for, while it is primarily intended for the prepayment consumer, it has a universal appeal to all classes of consumer.

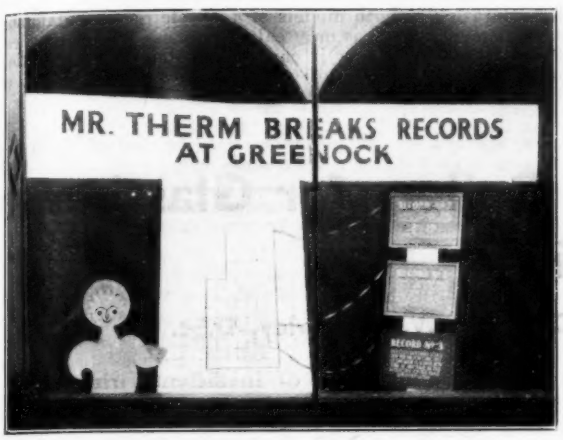
A Ten-Year Lighting Contract

Cambridge Town Council, on Aug. 1, decided to extend the contract for the lighting of the Borough for the next ten years by the University and Town Gas Light Company, and the Special Lighting Committee's report in favour of

a proposed improved new method of gas illumination in the streets was adopted.

Inasmuch as the Cambridge electricity supply is only in part generated locally, those who advocated gas emphasized its greater reliability and freedom from breakdown. One of the Committee's supporters, Dr. Alex. Wood, who is a university lecturer in applied physics, declared that nobody could predict which source of lighting would predominate, because it was still an open question. Recent experience did not lead him to expect much advantage from electric illumination from the point of view of new inventions.

"Mr. Therm" Breaks Records



The above was the heading given to a news item in the *Greenock Telegraph* recently referring to a large diagram which is being displayed in the window of the Greenock showrooms illustrating the ever-increasing demand on the Gas Department. The following three records are shown:

(1) Largest demand for gas ever recorded—2% up over previous year.
(2) Lowest average price since pre-war years. Reductions in last four years represent a saving of £8,000 per annum to gas consumers.
(3) The outstanding loan debt per million cu.ft. of gas made is lower now than at any time in the history of the Gas Undertaking.

Wandsworth and District Gas Company

Proposed Acquisition of Walton-on-Thames and Weybridge

An Extraordinary General Meeting of the Wandsworth and District Gas Company was held at the Company's Chief Offices on July 31, for the purpose of approving the provisional agreement for the transfer of the Walton-on-Thames and Weybridge Gas Company to the Wandsworth Company and of authorizing an application to Parliament or the Board of Trade for a Bill or Special Order to give effect to the agreement and confer further powers on the Company.

The area of supply of the Walton Company (about 15 sq. miles) includes the Parishes of Walton-upon-Thames and Weybridge in the Urban District of Walton and Weybridge and the Parish of Shepperton in the Urban District of Sunbury-on-Thames and adjoins the Kingston limits of the Wandsworth Company for a distance of approximately four miles, and also adjoins the limits of the Leatherhead Gas and Lighting Company for a distance of approximately three and a half miles.

When the Order which is now pending before the Board of Trade for the transfer of the Leatherhead Undertaking to the Wandsworth Company has been made the limits of the Wandsworth Company will adjoin those of the Walton Company for a distance of seven and a half miles. Considerable building development is taking place in the area of the Walton Company and the annual sales of gas show satisfactory increases.

The total paid-up share capital of the Walton Company consists of 3,000 ordinary "A" shares of £10 each entitled to a maximum dividend of 10% and 1,444 ordinary "B" shares of £10 each entitled to a maximum dividend of 7%, and £12,000 of 6% preference stock. Premiums amounting to £6,335 have been received on the issue of this capital. The Walton Company have created 4% debenture stock to the amount of £4,725 and 5% debenture stock to an amount of £26,000. They have for some years past paid their maximum dividends, but a sum of approximately £32,243, representing dividends on the "A" ordinary shares during the early years of the Company's existence, is still unpaid. In addition to their maximum dividends the Walton Company make payments on account of these unpaid dividends every half-year.

Among the principal terms of the proposed transfer the following may be mentioned. The Walton Company is to be transferred to the Wandsworth Company on Jan. 1, April 1, July 1, or Oct. 1, which shall first happen after the date of the Royal Assent to the Bill in Parliament or the date of the Order of the Board of Trade authorizing the transfer.

Every holder of "A" ordinary shares of £10 each in the Walton Company is to receive £13 of 5% preference stock and £5 of consolidated stock of the Wandsworth Company, and in addition £57 2s. 10d. consolidated stock of the Wandsworth Company for each £100 of dividends on such shares unpaid for previous years at the date of transfer, and so in proportion for any smaller amount of dividends so unpaid. Every holder of "B" ordinary shares of £10 each in the Walton Company is to receive £15 of 5% preference stock of the Wandsworth Company. Every holder of 6% preference stock of the Walton Company is to receive for each £100 of that stock £120 of 5% preference stock of the Wandsworth Company, and so in proportion for any smaller amount. Every holder of 4% or 5% debenture stock of the Walton Company will receive a similar amount of 4% or 5% debenture stock of the Wandsworth Company as the case may be. All such stocks issued by the Wandsworth Company will rank *pari passu* with the existing stocks of the Wandsworth Company.

The Wandsworth Company will pay and discharge the debts and liabilities of the Walton Company at the date of transfer and will undertake and perform as from that date all obligations, contracts, and engagements of the Walton Company.

The Chairman and Managing Director, Mr. Frank H. Jones, proposed that approval be given to the provisional agreement and Mr. R. M. Chart, senior Director, seconded with much pleasure and confidence. After the Chairman had replied to a few questions asked by a shareholder the proposals were carried unanimously.

The Amal Bunsen Burner

Additional Refinements of Design

New features of the Amal bunsen burner include a pressure-damping device, enabling the flame to be turned down still lower, and the provision of a set of detachable heads, which now equip it to meet practically every laboratory heating requirement.

Besides many distinctive features of its own, the burner

may be regarded as embodying the advantages of the Teclu, Méker, and Castell-Evans types. It will give as small a flame as an Argand for purposes of evaporation and gentle charring, a compact and perfectly stable hot flame with the unburnt zone confined to the base of the flame, as in the Méker, but which cannot strike back on the jet, and a large flame for boiling or distillation in large vessels.

A Range of Loose Heads.

These general purposes should be considerably extended by the range of chromium-plated loose heads now provided. The photograph shows the complete range of five loose

heads made for the smaller size burner (the Amal Minor, as it is to be called), also here shown side by side with the larger model (the Amal Major) for comparison. The head part of the air tubes of both sizes is now turned to definite limits of diameter to take the loose heads, two separate sets of which are available for the two sizes, with the exception of the special dental head and cap shown on the left, which is made to fit the Amal Minor only. This dental head gives an ordinary hot bunsen flame projecting at a convenient angle, and which can be rotated into any desired position. When making up a denture with such a flame, molten wax cannot drop into the burner and choke the jet, or even on to the burner stand. A quick change-over from the ordinary bunsen flame to a small luminous flame, such as might be required for use with sealing wax, is effected by putting on the small tip, shown in position in the photograph.

Also shown are the four standard loose heads, designed respectively for giving a horizontal rose flame, flat horizontal and vertical batswing flames, and an ordinary round vertical bunsen flame. The value of a readily-controllable rose flame which can be turned down very low will be recognized where, for example, it is desired to heat large beakers in which bumping is to be particularly avoided, and the horizontal batswing should be useful for heating large vessels which cannot be reached from underneath. The practical advantages of a really hot batswing will be recognized by all glass-blowers, and laboratory tests have shown that with these attachments the burner will give a flat flame some 100° C. hotter than that obtainable with an ordinary bunsen, and in which even Pyrex glass tubing will soften. The glass-blower is further catered for by the provision of a small hole at one side of the vertical batswing head, which admits of a little hot pin-shaped flame for spot-heating.

Stability and sensitivity of flame control are in no way affected by any of these loose heads, which have been specially designed to suit the proportions of the burner.

A still lower steady flame has been made possible by the incorporation in both models of a simple pressure-damping arrangement, which is only called into use for the smallest flames that the burner is capable of giving. Its function is to regulate the flow of gas in proportion to the size of the jet orifice.

Operation of Hand-Fired Boilers for Glasshouse Heating*

By L. J. Fowler, B.A., A.M.Inst.C.E., and W. F. Bewley, D.Sc.

During the last year an investigation of the methods of operating hand-fired boilers in nurseries has indicated clearly that the average nurseryman, fearing the serious financial losses which are likely to occur through inadequate heating, adopts fuels and methods of stoking which, while giving security, only do so at an unnecessarily high cost. In almost every case, with improved methods of firing and regulation of the existing boilers, big economies could be made without risk of damage to crops because of low temperatures.

Chief Causes of Fuel Wastage.

The lowest temperatures usually occur between 4 and 7 o'clock in the morning, and except on large nurseries where a night stoker is employed between these hours, the boilers are nearing the end of their banking period. In buildings, owing to the storage of heat in the building fabric, a reduction in the heat output from the boiler during this time rarely results in an appreciable fall in temperature; but in glasshouses the heat storage effect is practically non-existent, and it is, therefore, essential that the boiler shall maintain at least a constant heat output throughout the night. On banking the fires it is thus necessary to introduce sufficient fuel into the fire box, and adjust the dampers to maintain a regular heat output until the fires are attended in the morning.

Anthracite coal weighs approximately 40 lb. per cu.ft. and has a calorific value in the neighbourhood of 13,500 B.Th.U. per lb. The corresponding figures for coke are 25-28 lb. per cu.ft. and 12,500 B.Th.U. per lb. When, therefore, a boiler is charged with anthracite the potential heat storage in the fire box is one-and-a-half times that when it is charged with coke.

The grower who rarely has standards from which he can decide whether his heating costs are high or low, seldom complains to his stokers as long as the temperatures in the glasshouses are maintained at the degree demanded by the crops. The stoker has a larger safety margin with anthracite, owing to the increased heat storage capacity of a boiler fire box when consuming this fuel, and not being generally concerned with cost will use it whenever possible.

Inefficient Burning of Anthracite.

In many of the plants inspected the fires were piled up irregularly with lumps of anthracite and left for as long as twenty-four hours without attention. The ashpit door of the boiler had been removed, or had never been fixed, and the draught was ample. As the fire burnt it became thin in places and eventually the fire bars were exposed. Thus, in many boilers for twenty hours of the day, air streamed through the grate and up the chimneys without restriction, had a cooling effect on the boiler, and reduced its efficiency to the neighbourhood of 30%.

* Reprinted from the Twentieth Annual Report of the Experimental and Research Station, Nursery and Market Garden Industries Development Society, Ltd.

Demonstration of Inefficient Firing.

To demonstrate the inefficient method of operation employed, tests were carried out in three nurseries which were burning anthracite. During each test the boilers were stoked for twenty-four hours in the normal way by the nursery staff, the fuel was weighed, and glasshouse and external temperatures recorded hourly. A second twenty-four hour test was then carried out with gas coke, and in each case the boilers were left banked throughout the night for the period normally observed with anthracite. In the three tests the temperatures were maintained during the night, and at the commercial prices available at each nursery, the savings in the fuel cost varied from 45% to 64%.

In Tests 1 and 3 the external temperatures were in the neighbourhood of 40° F.; but in Test No. 2 the mean external temperature during the coke test was as low as 31·8° F. during the period from 6 p.m. to 7 a.m. During this test the boilers were not touched between 9 p.m. and 7 a.m., and the results demonstrate that, provided the fire box of the boiler is of sufficient capacity and the fire is properly regulated, glasshouse temperatures can be maintained throughout the night with coke even though the weather be really cold.

TEST No. 1.—18/2/35–20/2/35.

Test on a Dreadnought Boiler Heating 7 Houses (approximately 11,000 ft. of 4 in. pipe).

—	Gas Coke.	Anthracite.
Fuel in lb. consumed in twenty-four hours	1,512	1,638
Mean external temperature, 6 p.m.–7 a.m.	44·1°	45·5°
Mean temperature of glasshouses	57·7°	57·0°
Mean difference between glasshouse and external temperatures	13·6°	11·5°
Comparison of fuel cost for maintaining 1° difference between glasshouse and external temperature	55%	100%

Banking period 11 p.m.–8.30 a.m.

TEST No. 2.—5/3/35–8/3/35.

Test on Thames Bank Boiler and Lamb Boiler Heating 4 Houses and Dutch Lights (approximately 3,800 ft. of 4 in. pipe).

—	Gas Coke.	Anthracite.
Fuel in lb. consumed in twenty-four hours	895	1,456
Mean external temperature, 6 p.m.–7 a.m.	31·8°	40·3°
Mean temperature of glasshouses	62·2°	64·8°
Mean difference between glasshouse and external temperatures	30·4°	24·5°
Comparison of fuel cost for maintaining 1° difference between glasshouse and external temperature	36%	100%

Banking period 9 p.m.–7 a.m.

TEST No 3.—18/3/35–20/3/35.

Test on Thames Bank Boiler and Ideal Boiler Heating 4 Houses (approximately 1,600 ft. of 4 in. pipe).

—	Gas Coke.	Anthracite.
Fuel in lb. consumed in twenty-four hours . .	532	840
Mean external temperature, 6 p.m.–7 a.m. . .	43·1°	44·0°
Mean temperature of glasshouses	61·6°	63·7°
Mean difference between glasshouse and external temperatures	18·5°	19·7°
Comparison of fuel cost for maintaining 1° difference between glasshouse and external temperature	41%	100%

Banking period 9 p.m.–7 a.m.

Efficient Combustion of Solid Fuel.

The essence of the efficient combustion of solid fuel is the maintenance of a fire bed of even thickness. If the fire is too thin, or the fuel burns away in places to form air holes, excess air is admitted and has a cooling effect on the boiler. 100% excess air in itself means a fuel loss of 20%, and 200% a fuel loss of 30%. With many of the anthracite boilers seen in operation the excess air was above 200%. If the fire is too thick a loss of heat is caused owing to the formation of carbon monoxide, but this loss is not as serious as that obtained with excess air.

Owing to the desirability of an even fire, two points arise immediately:

(1) A graded fuel is necessary.
(2) The grate area should be ample.

If a graded fuel is used of size bearing a relation to that of the boiler, combustion will take place regularly, and the fuel will burn evenly through the whole area of the grate, and air holes will only be formed after a long period, when the fire bed becomes thin. If ungraded fuel is used, the smaller pieces will burn away and after a time leave the large lumps with spaces between them only containing a comparatively small volume of ash, and air holes form rapidly. The fact that coke is graded, whereas anthracite is ungraded, is a point in its favour and is probably the chief reason for the superior efficiencies obtained with the former in the tests on nurseries.

If the grate area is ample, the change in thickness of the fire is slower, and it can be maintained at efficient thickness for longer periods. Furthermore, the combustion of fuel per square foot of grate area being smaller, less clinker will be formed, which in turn enables the fire to be left for longer periods without cleaning, and minimizes losses due to unconsumed fuel being removed with the clinker.

Draught Regulation.

Much fuel is wasted in nurseries owing to the crude methods employed for regulating the draught. Ashpit doors are infrequently used, and flue dampers are often inadequate and sometimes non-existent.

Reduction of Fuel Cost.

In most nurseries a reduction of fuel cost by 30-40% can be obtained by overhauling or providing new boiler doors and flue dampers, and carefully selecting the fuel. In some cases, where the practice is to bank for eight to nine hours during the night, the fire box capacities of the boilers will make it necessary to use anthracite during really cold weather, but throughout the many comparatively mild nights during the year when the temperature does not fall below 40-45° F., with a little experience in the regulation of the draught, it will be found possible to burn coke with complete safety, and to obtain reductions in fuel cost equivalent to those obtained in the tests set out above. Coke is a lighter fuel than anthracite, and requires less draught; and it is always necessary to have an ashpit door and to take care that both this and the fire door of the boiler fit reasonably well.

In boilers of large fire box capacity, similar to those tested in Test No. 2, coke can be burnt throughout the year.

French Gas Industry

Review of the 58th Congress of the Union Syndicale de l'Industrie Technique du Gaz en France

(*Continued from p. 269.*)

A Tilt-Recorder for the Piston of a Waterless Holder.

V. Goffin described an apparatus employed at the La Villette works of the Paris Gas Company to record variations in the tilt of the piston of a waterless holder of the Klönne type. A knowledge of the magnitude and direction of the piston tilt and of the way in which the tilt varies is a valuable guide as to the presence of any abnormal resistance to the free movement of the piston since, as soon as any untoward circumstance arises, a tilt in the direction of the resistance should manifest itself.

Two types of piston movement are postulated. When the piston is floating freely, movement is of the "dead leaf" type. As the piston rises or falls, it makes small oscillations about horizontal axes of which the direction is constantly varying. Under these conditions piston tilt is but slight.

In the constrained type of movement, a more or less pronounced displacement of the piston occurs and the direction of tilt tends to be stable over a more or less prolonged time. Movement of this nature indicates that the piston is suffering greater peripheral resistance at one side than at the opposite side. When the piston is rising, it leans towards the side where the resistance is greatest and *vice versa*. Constrained movements normally occur when the wall lubricant needs renewal or when, during cold weather, it has become congealed or less oily. They may also be caused through distortion of the holder shell due to solar radiation or to a less extent through contraction of the shell due to cold weather. They need occasion no alarm unless they persist. Permanence even of an acceptably small tilt in a given direction indicates, however, that something is in need of attention.

The tilt-recording apparatus consists of two "horizontal pendulums," one recording tilt in a north-south direction and one in an east-west direction. [A horizontal pendulum is a mobile assembly suspended from two points one of which is nearly perpendicularly below the other.] Each pendulum is compensated to ensure that the north-south tilt recorder is not affected by east-west tilt and *vice versa*. The pendulums are fluid damped and each carries a pen arm travelling over a recorder chart on which is inscribed the magnitude of the tilt in the direction over which the particular pendulum operates. At the end of a limb extending from one pendulum is a disc carrying a chart on which a pen carried by the other pendulum records the resultant of the two individual tilts. Thereby the direction of maximum tilt is indicated. In conjunction with a chart of the gas content of the holder, the actual position of the point at which resistance occurs can be located.

The apparatus was designed to record a maximum tilt of ± 1 in 100—*i.e.*, an out-of-level displacement of ± 18 in. measured at the two extremes of a diameter of 150 ft. The velocity of the two recorder charts may be set at either 1¼ or 2½ in. per hour. A pen travel of 0·1 in. on the chart represents an out-of-level displacement of 1 in. Each directional component of tilt is recorded with an absolute error of ± 0·4 in. of displacement.

Play between the piston rollers and the holder shell can account for an out-of-level displacement of 0·8 to 1·2 in., hence displacements of this magnitude are without significance unless they persist.

The tilt recorder of the La Villette holder has been in use since October, 1934, and has shown that the holder has been working satisfactorily. The out-of-level displacement has not exceeded 12 in.—namely, less than 1 in 100, and this relatively small displacement has never persisted for an unduly long time. The only dissymmetry which has been noticed is that tilt is most frequent in one particular direction.

Systematic Exploration of the Distribution Mains for Leaks.

The length of the Lyons distribution system is 640 miles. By methods described by R. Gros, it was possible to survey and repair, in eighteen months, a length of mains representing 325 miles or almost exactly one-half of the system.

On the basis of the total annual expenditure involved, the savings due to the consequent reduction in the quantity of unaccounted gas more than covered the costs.

Pneumatic drills and aspirator tubes are employed in conjunction with the Nellissen gas detector. The latter has been proved to be an exceedingly useful piece of apparatus since a leak has invariably been discovered when the appliance has given a positive indication. Moreover, when other types of detectors were employed, it has been found that they never gave an indication which escaped detection by the Nellissen apparatus.

The drills and aspirator tubes employed represent improvements on the standard designs. In the case of the drills, the truncated cone which forms the tip has been increased in diameter at both the large and the small end; stronger springs are employed when work has to be carried out on hard roads; the life of the suspension chains has been increased by the insertion of springs between two of the links in order to reduce the effect of the repeated shocks. The aspirator tubes supplied with the Nellissen apparatus not being sufficiently robust, they were replaced with rods of a heavier gauge.

The mains inspection squad comprises a foreman and five men, one of whom drives the lorry carrying the air compressor and tools. Two men carry and operate the pneumatic drills, one uses the leak detector and two men are engaged in stopping up the bore-holes. The occupations of the five men are interchanged frequently, for example, hourly, so that all share equally in the work. The number of holes drilled per quarter has increased markedly during the eighteen months as the men have become more expert.

Holes are drilled every 2-3 yards along the distribution system and points where leaks are revealed are carefully charted. The exploration embraces both the main distribution system and the consumers' services which lead from it. In eighteen months, 2,012 leaks were traced. Large leaks are repaired by the mains department without delay and small leaks within a period not exceeding one month, the delay depending on the amount of more important work on hand. In the period under review, 2,110 repairs were effected. This is somewhat greater than the actual number of leaks traced since, occasionally, a single indication is obtained, in spite of the presence of two faults, if the drilling happens to be made between two defective joints.

An analysis of the causes of the various leaks shows that almost 80% were attributable to failure of rubber joints (42·1%) or leaded joints (13·6%), to pierced consumers' services (12·1%) or to faults at the junction of main and service (10·7%).

During the course of the repair work, rubber gaskets have been replaced with leaded joints. Where lead service pipes were pierced or broken at the flange, they were either repaired locally or replaced entirely for a certain length. Furthermore, to prevent a recurrence, heavier pipes were fitted for the first yard from the main. In addition, the form of the offtake connections on the mains has been altered with a view to the avoidance of sharp edges and their thickness has been increased.

During 1934, 250 miles of mains and branches were explored and 1,500 repairs were made. The cost of exploration was £840 (francs taken at par of exchange) and the cost of repairs was £760.

It remains to be seen, once the whole system has been covered, whether it will be advisable to carry on a continuous service of inspection or whether a new general inspection should be commenced at a later date.

Slide-Rule for the Calculation of High-Pressure Gas Distribution Systems.

Slide-rules so far devised in connection with high-pressure gas distribution calculations have hitherto been based on an assumed standard specific gravity for the gas and an assumed discharge pressure. F. Walter now describes the construction of a slide-rule by means of which a complete calculation based on the Chicago formula can be made since both these factors are treated as variables. The slide-rule is to be manufactured by the Société des Hauts Fourneaux et Fonderies de Ponts-à-Mousson.

Avoidance of Frothing during the Laboratory Distillation of Tar.

M. Quehen has demonstrated that frothing during the dehydration of tar in the laboratory is due to the falling temperature gradient in the direction: tar at the bottom of the flask—tar at the top of the flask—vapour phase. It can be avoided if this temperature gradient is reversed.

The device proposed by the author for use during the dehydration stage of the distillation embodies the well-known one which consists of the use of an auxiliary ring burner surrounding the distillation flask and situated a short distance below the tar level. To enable superheating of the vapour to be avoided, a horizontal asbestos sheet constructed in two parts and having a central hole is fitted snugly around the flask some distance above the tar level. In addition, a special form of spray catcher constructed from a disc and two segments of copper foil is employed. The pieces of foil are mounted horizontally, by means of nuts and distance pieces, on a threaded vertical rod which passes through the cork of the distillation flask. The disc is situated just below the level of the side-arm and has a diameter 2 mm. less than that of the neck of the flask. The two segments, facing in opposite directions and having diameters slightly greater than the diameter of the neck, are mounted, respectively, 7 and 8 mm. below the disc. The French type of tar distillation flask has a short neck, hence, when the assembly is in the correct position, the two segments lie just above the plane at which the neck commences. The spray catcher is pushed into the flask so that the segments come into the spherical portion of the flask. Their flexibility renders this possible in spite of the fact that their diameter exceeds that of the neck of the flask. The rod is then slightly withdrawn so that the segments come up into the neck, their contour then forming a prolongation of the contour of the flask.

If full use is made of the ring burner, frothing is completely eliminated but some superheating of the vapour occurs. Hence only sufficient gas is supplied to this burner to ensure that the froth layer does not exceed about $\frac{3}{8}$ in. in thickness. Under such conditions, the contents of the flask do not froth over and the vapours are not superheated by more than 2° or 3° C. Tars containing at least 20% of liquor can be successfully dehydrated and it is unnecessary to keep constant watch over the apparatus.

Long-Distance Gas Transmission to Quiberon Bay.

The provision of a gas supply to a number of townlets in the Quiberon Bay district was described by Pierre-Louis Durand.

The population of the district is 9,000 but is swollen by between 15,000 and 20,000 visitors during the summer holiday season. Conditions for a gas supply were therefore not favourable, it being estimated that the ratio of the maximum to the minimum daily requirements would be as large as 5 : 1.

It was decided to obtain gas from the Gas-Works at Vannes. The initial section of the main as far as Auray (12 miles from Vannes) is $3\frac{1}{8}$ in. in diameter and the remainder is $2\frac{3}{8}$ in. in diameter. A smaller main and a higher distribution pressure would have been slightly more economical but, for a variety of reasons, it was decided not to employ a small main. From Auray, the main continues for a length of $7\frac{1}{2}$ miles to Plouharnel and then divides into three branches, one to Carnac (2 miles) and la Trinité 2 miles beyond, one to Quiberon (9 miles) *via* Kerhostin and St. Pierre and one to Étel (6 miles). An extension of the Étel branch to Riantec and Port-Louis (9 miles beyond Étel) is contemplated.

Seamless steel tubes with welded joints were adopted.

The compressor plant at Vannes consists of two double-stage rotary compressors each having a capacity of 7,000 cu.ft. of free gas per hour. It will be possible, subsequently, to install further compressors as the demand for gas increases since three compressors can be made to feed into the main. The gas is compressed to a gauge pressure of 142 lb. per square inch, this being the highest pressure so far adopted in France for a gas grid. Automatic devices cut out the compressor motors in the event of an excessive pressure rise, a failure of the lubricating system or an excessive temperature rise of the cooling water.

Holder stations have been erected at Carnac and at Quiberon. At each station there are two cylindrical high-pressure holders each having a water capacity of 2,800 cu.ft. Calculations showed that it was more economical to deliver the gas direct to the holders at a high pressure than to adopt a low initial pressure and boost the gas to a high pressure at the holder stations.

At each of the towns supplied, reducing valves and governors are fitted. The pressure is reduced in stages, first to a gauge pressure of 14 lb. per sq.in. At this pressure the gas passes direct to outlying districts and/or to low-pressure governors where the pressure is reduced to 4 in. W.G. for local distribution. The governors and valves are fully protected with safety devices.

Plugged service branches have been welded to the distribution mains in front of each house to facilitate the supply of gas to new consumers.

(*To be continued.*)

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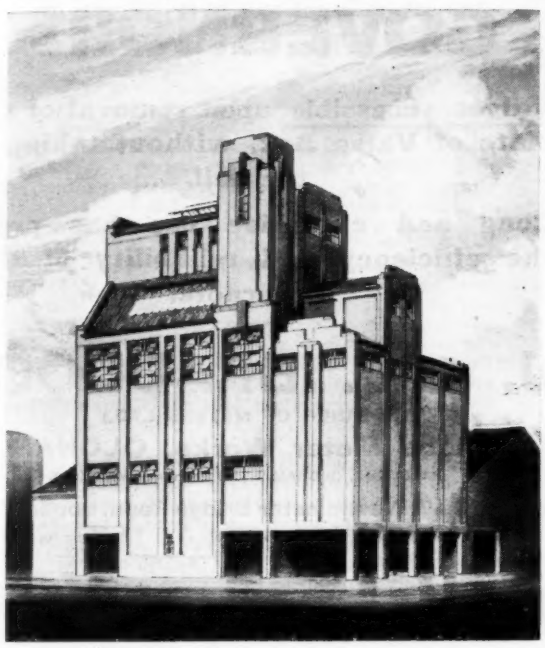

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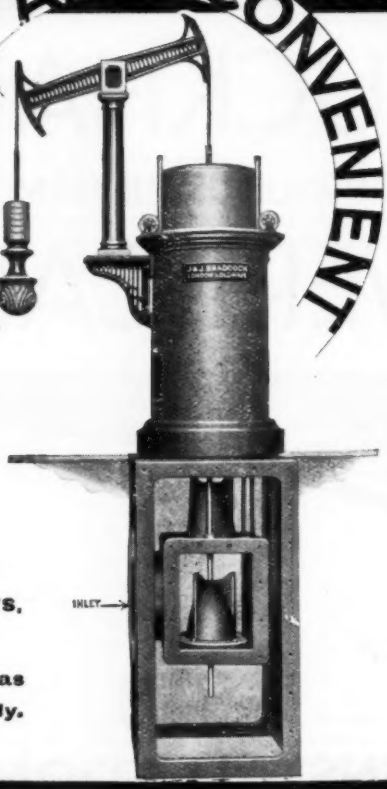

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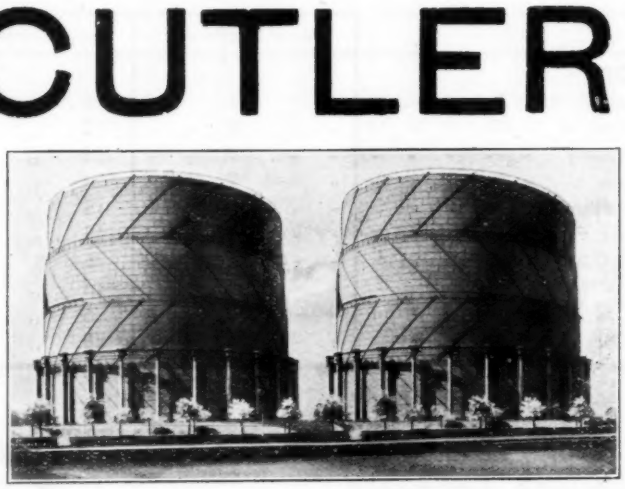

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Care and Appreciation of Gasholders

by
W. T. JEBB

This Paper, by Mr. W. T. Jebb, of the Connecticut Ligh: and Power Company, was presented at the Ninth Annual Business Conference of the New England Gas Association.

A gasholder is an outstanding piece of equipment in many ways. Its dependable and faithful performance of a very essential service over a long period of years is remarkable and has few parallels.

In this period of keen electrical competition it affords a distinct advantage in the very important feature of storage, by which gas produced in the plant generating equipment, during periods of low consumption, is available to the distribution systems in periods of high consumption. Electrically the storage battery and the impoundage of water only approach the advantages of the gasholder which, in part, affords to the consuming public a real guarantee of service continuity.

On account of the prominent position it occupies on the horizon, a holder is sometimes the object of criticism. However, a full realization of the part it plays in providing a useful service, the engineering achievement it represents, and the dogged faithfulness with which it performs should be made clear to those so prejudiced. Incidentally, a little consideration to painting, planting, and adequate fencing, along with the general improvement of adjacent property usually helps a great deal in this connection.

The development of gasholder design and construction has been most interesting since Lavoisier evolved the principle of the gasometer in the year 1782, using a water seal for the storage of oxygen gas in the laboratory. For over one hundred years this fundamental principle has endured in gasholder design, and it is only within recent years that the waterless or piston type of holder and high-pressure steel tanks have come into prominence. Over this long period of practical test there has been established a very remarkable record of holder performance which indicates that a gasholder is a safe and dependable structure, and this fact is evidenced by the decisions of courts, commissions, and the various reports of insurance companies.

In general, it is the case that when holders are taken out of service the reason for doing so is obsolescence rather than unreliability, and in most plants the piece of equipment with the longest service record is the holder. An interesting example is the old Murdoch holder in England, erected in the 1790's and taken out of service during the world war, after having been in continuous operation during the intervening period.

Inspection.

There are, according to statistics of the United States Department of Commerce, approximately 1,450,000,000 cu.ft. of gas storage in service in this country, representing a tremendous investment, and it is needless to say that all reasonable precautions should be taken to safeguard and prolong its useful life.

A routine system of thorough inspection of holders by competent persons at frequent intervals is the most effective and cheapest means of insuring proper maintenance. The Industry has always recognized as good engineering practice the making of routine inspections, and most companies have some sort of holder inspection routine. An increasing number of companies are deeming it advisable to have their holders inspected by representatives of holder builders, who, in submitting a detailed report of their findings and recommendations often cover points lost sight of by regular company employees.

Regardless of whether the inspection is conducted by outside or local forces, the men employed should be qualified, experienced, and competent, not only to report on the physical condition of the holder, but also to make recommendations as to what might be done to anticipate difficulties and to improve operating conditions and costs. In every case appropriate forms of reports should indicate the extent of the inspection along with the findings and recommendations relative to each item covered. These reports should be submitted to and receive the prompt attention of a responsible operating official, who should see to it that any weaknesses are corrected at once.

Corrosion is the outstanding factor in connection with holder maintenance and the limit of useful life of holders is largely dependent on the amount of corrosion taking place. Any reasonable expenditures on preventive measures that will eliminate or mitigate corrosion is extremely valuable insurance.

There are certain fundamental facts that have a pertinent relation to holder corrosion, and in the analyses of actual cases of holder difficulties theory and practice seem to agree in the following regard:

(1) Iron, in its various forms, corrodes in the presence of water and oxygen, and the action is aggravated by carbon dioxide, sulphur, and cyanogen compounds.
(2) Iron will not corrode at normal temperatures in the entire absence of moisture.
(3) The relative corrosion of the various forms of holder iron varies greatly under different conditions.
(4) Corrosion is rarely uniform over the entire surface of the holder.
(5) Iron or steel is more subject to corrosion while under strain or after being stressed beyond the elastic limit.
(6) Corrosion in acid waters takes place more rapidly than under neutral or alkaline conditions.
(7) Dissimilar materials in contact with each other or in the presence of impurities dissimilar to the iron or steel in which they are embedded, along with the acid water acting as an electrolyte, set up a battery action causing varying degrees of pitting.
(8) The condition of an unequal supply of oxygen in the tank water at the metal surface of the tank shell tends to accelerate corrosion at certain areas and retard it at others. This condition is sometimes referred to as a concentration cell effect, a form of electro-chemical corrosion. The layer of water at the top of the holder tank having the greatest oxygen, together with the steel shell of the tank in this region, forms the cathode. The lower levels of water, low in oxygen, along with the steel tank shell form the anode. All corrosion seems to take place at the anodic zone.

As most holders are made exclusively of iron in one form or another they are subjected externally to corrosion from the elements, waste gases from stacks, and other corrosive agents of the atmosphere. The most positive preventive measure consists of the careful cleaning and preparation of the surface of the metal and the proper application of a good grade of paint along with subsequent diligent and systematic follow-up, the latter being extremely important.

Internal Corrosion.

Internal corrosion is more difficult to detect and protective measures are less effective. However, it is fortunate that it takes place to a lesser degree, as the majority of holders that have been in service over a long period of years when examined internally still show the original bloom of the metal, or an otherwise satisfactory condition.

Nevertheless, the metal on the inside of a holder is subjected to conditions very favourable to corrosion—namely, water, oxygen, carbon dioxide, varying amounts of sulphur, ammonia and cyanogen compounds, along with all the conditions suitable for corrosion under water. The brown stains noticed on the lower lifts of many holders show, upon analysis, a high percentage of iron, indicating that corrosion to some degree is taking place. It is the practice at some plants to suspend carefully weighed strips of steel plate in the inlet connection to the gasholder and remove them at stated intervals to note any change in weight. This may indicate to some extent the corrosion going on inside the holder.

Deep circulation of tank water, various methods of chemical treatment, oil filming, use of inhibitors and periodic change of the water have all been tried as preventive measures for internal corrosion with varying degrees of success. Some companies have used protective coatings on the inside plates of tanks, lifts, and crowns.

There has come to the Industry in recent years a realization of the fact that there is but one positive way of determining the internal condition of a holder and that is to purge, drain the tank, elevate the lifts by means of lowering screws, and make a careful inspection of the entire surface of the tank sections and crown. In the past

there has always been great reluctance on the part of gas men to take a holder out of service even though conditions may be favourable to so doing. However, to-day many companies have adopted the practice of taking every holder out of service for internal examination at 20 to 25 year intervals—or, as a result of any routine inspection there appears a reasonable doubt as to the condition of the metal. It must be borne in mind that a major repair may make it necessary to take a holder out of service under most unfavourable circumstances.

In addition to periodic inspections, operating and maintenance routines should receive careful consideration.

Operation and Maintenance.

It is most important that proper and complete, preferably written, instructions be issued regarding all routines to be followed and the holder attendants and operators made familiar with all details of these routines; and, in addition, their particular responsibilities in this regard should be clearly defined, bearing in mind that in the case of holder accidents the human element has generally been a contributing factor. Record should be made of all operating and maintenance data, whether a separate form be provided or it is made part of the plant log is a matter for local decision, but in any case the information should be systematically recorded and brought to the attention of the responsible person directly in charge of operations.

There should be framed drawings of the valve and holder piping system displayed in a convenient location so that they can be referred to in an emergency. The valves on these drawings should be properly and plainly marked, and the valves themselves tagged with the corresponding markings.

The practice in purging holders should conform to the latest methods prescribed by the American Gas Association, also all safety precautions and recommendations as set forth by the American Gas Association Holder Committee should be closely followed.

The proper lubrication of a holder is a very essential routine.

Only comparatively recently has it been standard practice to equip carriages with Alemite or similar fittings.

The writer has equipped one holder with graphite impregnated self-lubricating bushings. It is thought that this type of lubrication will eliminate the cost of grease and oil, special fittings, drilling of rolls, along with the necessary time required in routine lubrication. Experience thus far has been satisfactory. A forced feed accumulator is at present being developed by one of the holder construction companies, in conjunction with lubrication experts. It is claimed that this unit will require infrequent attention and will be designed to afford positive lubrication. Equipment of this sort, however, should not relieve the operators from the responsibility of frequent inspection and proper operation of carriages.

Cups and Grips.

Daily attention should be given to the condition and depth of water in cups and the height of water in the tanks to safeguard against the effect of any siphoning action in the winter months and evaporation during the summer. Cups should be frequently examined for foreign material, such as stones, paint brushes, wrenches, leaves, and débris of all sorts. Ashes and cinders falling from neighbouring stacks accumulate in surprising amounts and may affect the normal action of the sealing water whenever the holder pressure varies. Cups can be cleaned out by flushing with a hose and solid accumulations remaining can be removed by scrapers.

Probably the most vulnerable sections of the entire holder, from a corrosive standpoint, are those sheets of the cup and grip which are so frequently exposed to a wetting and drying effect. Evidences of corrosion at this point should be watched very carefully, and at frequent intervals the water level should be lowered sufficiently to allow for a careful conditioning of the metal surface, followed by a coat of good paint. Ample time should be allowed for properly drying before the surface is again submerged.

It is essential that foundation levels be checked frequently for uneven settlement. The routine of taking tank levels at the walk-way by the measurement of the distance from the top of the tank down to water level at several points around the circumference of the tank is a rough check, but frequently a transit should be used to determine elevations and plumb columns. Any deviation of the columns from the vertical position can thus be detected and remedied to prevent structural strains.

Foundations should be properly drained. The general practice of cementing around the bottom curb angle, or use of composition binding materials should be frowned upon, as no filling material has as yet been found to be entirely satisfactory. Proper conditioning of the metal and the application of a good grade paint appears to be the best method of protection. The same procedure should be followed in connection with tanks having masonry or brick protecting walls, particularly if it is found that moisture is finding its way between the steel shell of the tank and wall.

The multiplicity of parts in guide frames, the different shapes used, along with the lattice-work generally found in the older holders, allow an excellent opportunity for corrosion. The carriages, stairways, platforms, and hand rails likewise offer similar opportunities. In places that are difficult of access it is good practice to refrain from using any roofing cement, putty, or similar materials; instead it should be a routine to clean these crevices thoroughly with specially designed tools and apply a good grade of paint. Wherever it is possible, drain holes should be drilled to prevent the accumulation of water.

As in the case of the cups it is necessary to watch carefully the top shell sheet of tanks at the water line. Occasionally the water level should be lowered so that the corroded surface can be scraped and painted. It is also important to keep the surface of tank water as free from oil condensate as possible, as its action on paint is destructive and is one of the contributing factors of corrosion to cup and grip sheets at water line; also an oil accumulation presents a potential fire hazard.

The most frequent cause of the few mishaps to water seal holders has been due to failure of the crown. It is known that the weaving action which takes place in the thin crown plating causes fatigue of the metal, which aggravates any existing corrosive conditions until the plating becomes incapable of withstanding the very considerable stresses which are developed in the crown of the holder.

In many of the older holders it is common practice, when slightly higher pressures are required, to load the crown with pig iron or concrete blocks without regard to the additional stress imposed upon the top curbing and crown sheeting beyond what could be reasonably expected of the thickness of the crown plates.

Winter Operation.

The problem of preventing the formation of ice in a steel tank and cups at extreme temperatures requires special consideration involving additional operating routines. Of these the frequent observation of water temperatures is the most important. An ordinary wooden case thermometer is recommended for the cups, and either a minimum reading thermometer or a thermometer inclosed in a glass bottle which can be lowered at any desired level is suggested for the tank readings. A combination indicating pyrometer and multi-point rotary switch with resistance units placed at desired locations in cups, or tank, is obtainable at a very moderate cost.

It is essential to have ample circulation in the tank and cups. The existence of tar storage in holder tanks may sometimes prevent proper circulation, and it is advisable to have live steam connections available. An analysis of difficulties with anchor ice, particularly in relief holders, indicates that in some instances if gas had continued being made in the holder, regardless of the blowing of seals, no damage would have resulted, and in other cases it would have been a comparatively simple matter to hold up the lifts in place by tying to the framework. However, the real answer to the problem is to prevent ice from forming.

The removal of snow is a routine which most companies take care of promptly. It is advisable to equip the bottom surface of pushers or shovels with old hose or rubber to prevent scraping holder paint. Also there should be rings in the centre of the holder crown for the attaching of safety lines and belts, or other safety provisions provided on crown for men removing snow. If holders are not equipped with stairways, most certainly the ladders should be provided with safety cages.

Many companies in order to assist in keeping watch on holder operation have installed on all active storage holders alarm signals for high and low caution and danger points, along with an indicator to show the volume of gas in holder. It is advisable where practical to motorize the inlet, outlet, and by-pass valves of storage holders so that they can be operated at a location remote from the holder. All holder connections should be provided with an accessible water connection for flooding and sealing purposes in case of valve failure.

Compressors and exhausters connected to gasholders may be equipped with automatic stopping devices to shut down at low danger points. Signal lights and alarms indicating the height of relief holders are of assistance on the generator house operating floor.

Automatic devices, however, should not relieve the operating men from responsibility of keeping a personal check on the holders by direct inspection.

Painting.

The methods and materials involved in holder painting are very controversial issues There have been many pre-

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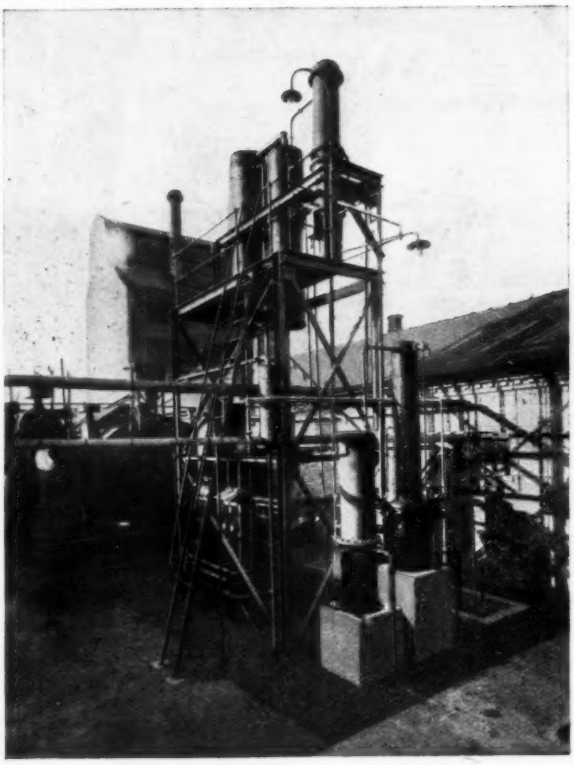

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mature failures with the best of paints, and although it is difficult to point to the fundamental cause, one of the contributing factors is that in a great many cases sufficient time is not given for the paint to dry before it is immersed in the water. This often happens when the painting is done from the walk-way as the holder rises. The necessity of thoroughly cleaning the surface of the metal before painting is generally recognized but can only be obtained by rigid inspection and supervision at the time the work is being performed.

Much of the holder painting work in New England is let by contract to outside firms under rigid restrictions, and the arrangement is said to work very well.

A great deal can be said in regard to the care of gasholders, and in this very brief attempt to cover the subject it is primarily intended to call attention to the importance and value of periodic inspections, the method by which they should be undertaken, along with the significance of proper operation and maintenance routines.

The ever present agencies of corrosion present a potential damaging force which can be combatted only by relentless effort carried on in a systematic, routine way.

The Selection and Use of Lubricants in Gas-Works

by
W. E. GOODAY

The variety of plant in use by gas undertakings necessitates the selection of an adequate range of lubricants. In the following article Mr. Wilfred E. Gooday, A.R.S.M., D.I.C., M.Inst.M.M., M.Inst.P.T., points out that whereas general purpose lubricants and those used on rougher plant and machinery present no particular problem, the needs of machinery of greater refinement can be met and duly satisfied only if a degree of care is employed in the choice and use of lubricants.

From every point of view it is desirable that the types of oils and greases should be reduced to the least number that will satisfy the various demands.

These notes are intended to describe to the user a broad aspect of their subject from a consideration of which tangible economies may be derived. Discussion of the technical details of physical and chemical characteristics of lubricants—often productive of misunderstanding and inconclusive controversy—has been omitted so as to leave a sharper outline to this reconnaissance survey of lubrication practice.

The technique of lubrication does not rest at the choice of oils or grease; the further steps include consideration of application, handling, storage, and reconditioning of lubricants—where the circumstances of use permit and justify this further operation.

Selection of lubricants may be made by:

(*a*) Manufacturer of plant or machinery.
(*b*) Supplier of lubricants.
(*c*) User of lubricants.

(*a*) Whether his motive be simple or complex the manufacturer of a machine is unlikely to recommend or endorse the use of an unsuitable lubricating oil or grease for its lubrication, but it is by no means certain that he recommends the products that show the best all-round value to the user.

In fact, responsibility for the choice of oil may be transferred by him to an oil supplier so that method (*a*) becomes virtually method (*b*).

(*b*) The supplier's wide experience can be called upon in making his selection and generally such choice is technically sound. The service provided by certain reputable suppliers has much to recommend it and is paid for in the price charged to the user.

(*c*) i. Where the user is in a position to define his requirements by consideration of the plant to be lubricated and by drafting specifications for the lubricants he needs, he can compare the competitive tenders of several suppliers on equitable bases.

Certain of the largest undertakings in Great Britain—*e.g.*, Imperial Chemical Industries, Ltd., and a few others—have been able to adopt this method of buying through the agency of their own technicians.[1]

ii. In other organizations where the permanent employment of technical skill appropriate to the purpose would be out of proportion, collaboration with a specialist acting solely in the users' interest can achieve comparable economies. The consultant should be engaged to prepare specifications and to co-operate in drawing up a complete scheme of lubrication and not be allowed merely to enunciate a series of unheeded recommendations.

The methods of selection described under (*c*) above, evoked by an appreciation of the significance of efficient lubrication and care for its economical attainment, constitute but the first step in the ancillary engineering technique outlined in these notes.

In preparing a lubrication scheme the number of oils and greases should be reduced to the minimum in order to simplify storage arrangements and to obviate error but, allowing for exceptional circumstances, this should not be carried to the extreme where, say, an air compressor or a turbine oil is wastefully applied by hand to rough machinery.

The technical factors that must be taken into account in selecting a lubricating oil vary with the purpose in view but an outline of the needs of air compressors, steam engines, and steam turbines may be cited as examples:

Air Compressors.

i. Minimum fluid friction, reducing waste of power, suggests the use of an oil that is not unnecessarily viscous.

ii. Homogeneity, indicating an oil of a restricted range of hydrocarbons, not an indiscriminate blend of extremes. Chemical stability offers resistance to changes in composition of lubricant due to oxidation or to polymerization.

iii. Minimum tendency to carbonization ensures that the oil even under oxidizing conditions and in contact with impurities in air intake will not too readily provide the source of carbon with which those impurities accumulate to form undesirable deposits that interfere with valve operation. Even so it must be remembered that over-feeding of the best lubricant may be as productive of deposits as is the use of inferior oils.

Steam Engines.

i. Minimum fluid friction is a factor that must be combined with adequate film-forming property to eliminate avoidable friction.

Spread of oil film is accelerated by addition of suitable fatty oil which will also assist in maintaining cleaner operation where priming may prevail. The presence of the fatty oil is advantageous also where lubrication must be effected under the moist conditions that exist in certain steam cylinders.

Where condensate is used as a source of boiler feed or is employed in manufacturing processes a pure mineral oil which as compared with a compounded oil separates more readily from exhaust steam is preferable.

[1] See "Selecting Lubricants for Industrial Purposes," G. I. Higson. *Industry Illustrated*, September, 1934.

ii. Necessary piston seal, preventing loss of energy through steam leakage, calls for oil of suitable viscosity at operating temperatures.

iii. Composition of the oil must be such as to offer maximum resistance to the formation of carbon deposits.

Choice of Steam Cylinder Oils.

Factors affecting the choice of steam cylinder oils that arise from the character and conditions of operation of the engine itself evoke the following comments:

Size.

This is a measure of the areas to be lubricated and, with the factor of speed, influences the time effect on oil of steam temperature and pressure.

Load.

A reduction in load from that rated may bring about low temperature and wet steam conditions.

Steam Factors.

Pressure and temperature: High steam pressures accompanied by high steam temperature have a thinning influence on the oil film for which provision must be made by selecting an oil that will have suitable viscosity under working conditions.

Condition and quality: Wet steam will have greater wiping effect on a pure mineral oil than on an oil compounded with a small quantity of fatty oil. For wet conditions as indicated above a compounded oil possesses the distinct advantage of its tendency to emulsify.

Impurities in the steam constitute a factor as previously suggested.

Speed.

Motion of the moving parts may aid in the spread of oil but at the same time subjects the oil to shearing forces. R.p.m. and size indicate relative speed of rubbing surfaces and to them also is related the time during which temperature and pressure attain their maximum effect.

Steam Turbines.

i. Minimum fluid friction is a factor that must be combined with adequate film-forming property to provide lubrication at the periods of starting and stopping rotation. During running the oil serves as a cooling medium rather than as a lubricant except for the requirements of the governor gear.

Broadly, there exists a preference in steam turbine lubrication for the least viscous lubricants and such oils offer better cooling properties.

ii. Chemical stability has constantly been the aim in manufacture of turbine oils. Resistance to oxidation and internal chemical change are necessary to reduce the sludge and emulsion-forming effects of these reactions.

The oil characteristics implied by the foregoing general factors have then to be balanced with mechanical considerations. For air compressors and steam engines size, type, and operating conditions must be borne in mind, also methods of application and distribution. For steam turbines in geared sets where the circulatory system is common to both bearings and gears a more viscous lubricant is required than is necessary for direct-coupled sets.

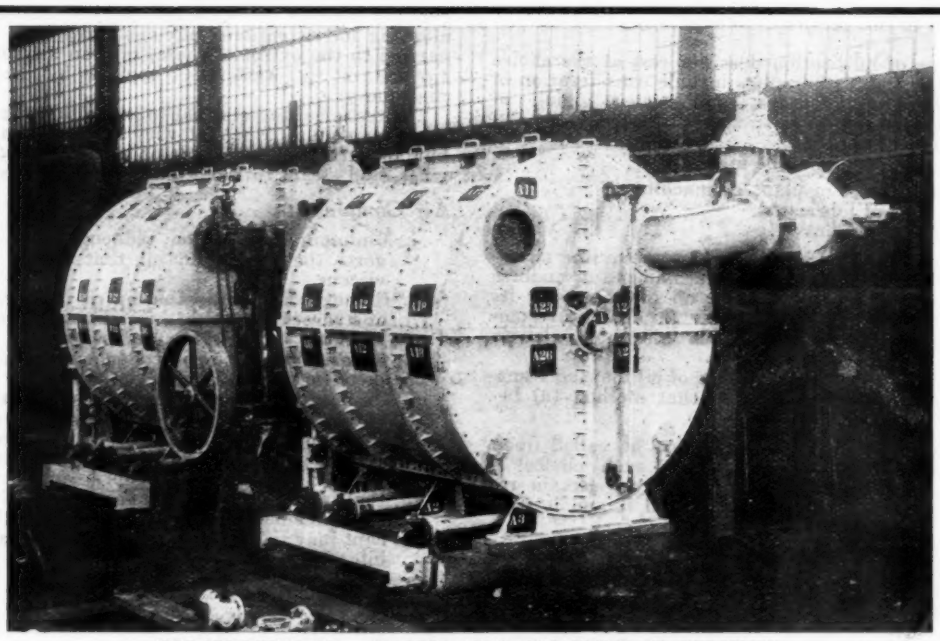
Little more than a passing reference can be made to the technical considerations that arise during the use of lubricating oils. The quantitatively more important oils in the circulatory systems of steam turbines provide the best example. The influences affecting the life of such oils may be enumerated as:

1. Air.
2. Temperature.
3. Turbulence.
4. Water.
5. Impurities.

1. *Air.*

The oxygen of the air combines with the less stable constituents of the oil forming oxidation products that facilitate the emulsification of the lubricant with any water that gains access to the system. Further oxidation accompanied by polymerization may produce semi-solid insoluble deposits or sludges that must be removed from the oil (preferably at its coolest state) to obviate their accumulation and interference with heat transfer in the oil coolers and elsewhere.

Obviously then aeration of lubricating oil in a circulatory system should be avoided where possible.



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2. *Temperature.*

As an accelerator of chemical change this must be reckoned as a factor. It is not as potent in turbine lubrication, effected at modest temperatures, usually below 180° F., as it is in the lubrication of I.C. engines where cylinder oil is subjected to the temperature of combustion.

3. *Turbulence.*

A factor controlled largely by the original design of the oil system, turbulence may be reduced by the avoidance of sharp bends in oil pipes and maintenance of ample volume of oil in the system. The attainment of non-turbulent flow reduces aeration.

4. *Water.*

Whereas in steam cylinder lubrication readiness of the cylinder oil to emulsify with moisture may be a necessary characteristic and is provided for by adding a small quantity of fatty oil—*e.g.*, lard oil or tallow oil, to the lubricant, in a circulatory system emulsions are to be avoided.

This is achieved by preventing the accumulation of water in the system and by using a type of oil which, when maintained in good condition, possesses a high resistance to emulsification.

Most systems are subject to access of water from steam glands or possibly from leaky cooler tubes. An analysis may discover the source.

Water *per se* is an intruder but it may bring with it soluble ingredients that act as emulsifying agents or react directly or catalytically with the less stable hydrocarbons of the oil.

5. *Impurities.*

Reference must be made to impurities other than those introduced by water. Most metals act as catalysts in the processes of oil decomposition, copper being one of the most potent, but the oxides of iron, lead, zinc, and copper will combine with oxidized oil to form metallic soaps, traces of which under critical conditions are active emulsifying agents.

The normally remote possibility of alkali being carried over by priming cannot be ignored as a potential source of contamination.

The user can take advantage of his knowledge of the effects on oil in a circulatory system of the factors mentioned above.

Removal of Impurities.

Normal practice includes the regular withdrawal of any appreciable quantities of water that may find their way into such systems but the further removal of traces of other adventitious impurities will usually repay the exercise of such care. Centrifuges designed for this purpose have now become normal to land and marine installations.

Judicious choice in the first instance and careful treatment in use may extend the durability of turbine oils to many years of satisfactory service.

As an example of what can be achieved by suitable treatment of used oil the reconditioning of I.C. cylinder oils may be cited as presenting a field that is productive of immediate and considerable economy. Here the most persistent contamination is the result of partial combustion and particles of carbon are so finely divided in the used oil that it is usually described as a colloidal suspension. This carbon is responsible for the black appearance of such used oils and it will not respond to ordinary filtration or to centrifugal treatment.

Unless it be removed the oil should not be regarded as serviceable for continued use as cylinder oil. It is completely separable by the streamline filter, the use of which is contributing very substantially to the reduction of lubrication costs of diesel and other I.C. engines.

In these brief notes it will not be out of place to add that although the first object to be sought from a review of lubrication and lubricants may be immediate economy obtainable from technically controlled purchase, where available, equally valuable and continuous returns are afforded by:

Elimination of faulty lubrication.—Reduction in stoppages.

Reduction of avoidable friction.—Reduction in power consumption.

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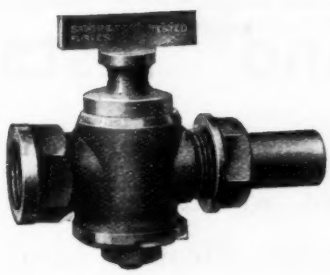

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Stock Market Report

(For Stock and Share List, see later page)

Despite the holiday atmosphere, business on the Stock Exchange last week was unusually active. Three home Corporations, West Bromwich, Dundee, and Lowestoft, made issues, all of which were largely over-subscribed and their success gave a fillip to gilt-edged stocks, a feature being the new Transport 2½% loan recently issued at 97 which closed at ⅞ premium. It is interesting to note that more new money was subscribed in July than in any month since March, 1920. The latest drop in the unemployment figures, coupled with further favourable reports, led to big investment buying in the Industrial section, and most of the leaders improved in value.

The Gas Market was also well supported and several issues improved in value, while in some cases, though business was done at above the quotation, no change was recorded. Among those to improve, South Metropolitan ordinary advanced a further 1½ to 128, the South Eastern Gas Corporation shares were in demand, and the ordinary gained 6d. to 28s. 6d. and the 4½% preference 3d. to 23s. A few parcels of Northampton 5% maximum came into market, and the price improved 2 points to 109½. At the local Exchange, the two Bristol 4% debenture stocks improved, and Liverpool ordinary rose a fraction to 140½.

With few exceptions the values of gas securities have increased since a year ago. The position is illustrated in the following table giving eighteen of the principal ordinary stocks, and it will be seen that of these eleven show an improvement, three are now quoted at the same figure, while four have suffered a loss.

—	Quotations. Aug. 3. 1934.	Quotations. Aug. 2. 1935.	Increase + or Decrease −
Alliance and Dublin	130—140	130—140	..
Bournemouth 7% max.	167—172	168—173	+ 1
Brighton 5%	151—156	153—158	+ 2
Bristol 5% max.	116—118	120—123	+ 4½
British	155—160	154—159	− 1
Cardiff	126—131	127—132	+ 1
Croydon sliding scale	154—159	155—160	+ 1
Gas Light units	27/—27/6	28/—28/6	+ 1/-
Imperial Continental	205—215	215—220	+ 5
Liverpool	133—134	139¼—141½	+ 7
Newcastle units	25/6—26/6	25/6—26/6	..
Portsmouth 4%	168—173	173—178	+ 5
Sheffield	139—141	141—143	+ 2
South Metropolitan	135—138	126—130	− 8½
South Suburban	132—135	130—135	− 1
Southampton	110—115	116—121	+ 6
Tottenham	153—158	148—153	− 5
Wandsworth	157—162	157—162	..

Current Sales of Gas Products

The London Market for Tar Products.

LONDON, *Aug.* 3, 1935.

There is little of interest to record in the Tar Products market, prices being approximately as follows:

Pitch is 33s. to 34s. per ton f.o.b.

Creosote, about 6d. per gallon.

Refined tar, 4d. per gallon in bulk at makers' works.

Pure toluole, 2s. 2d. to 2s. 3d.; pure benzole, 1s. 7d. to 1s. 8d.; 95/160 solvent naphtha, 1s. 5d.; and 90/160 pyridine, about 4s. 6d. to 4s. 9d.—all per gallon naked at makers' works.

Tar Products in the Provinces.

Aug. 3.

The average prices of gas-works products during the week were: Gas-works tar, 18s. to 23s. Pitch—East Coast, 31s. to 33s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 31s. to 33s.* Toluole, naked, North, 1s. 8d. to 1s. 9d. Coal-tar crude naphtha, in bulk, North, 6¾d. to 7d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 5½d. Heavy naphtha, North, 9½d. to 10½d. Creosote, *ex* works, in bulk, North, liquid and salty, 5¼d. to 5½d.; low gravity, 5d. to 5⅛d.: Scotland, 5d. to 5⅛d. Heavy oils, in bulk, North, 5d. to 5½d. Carbolic acid, 60's, 1s. 11d. to 2s. Naphthalene, £10 to £11. Salts, 60s. to 75s., bags included. Anthracene, "A" quality, 2½d. to 3d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Aug.* 3.

While inquiries are quite numerous there is not a great deal of new business being placed and prices are practically unchanged.

Crude gas-works tar.—The actual value is 28s. to 30s. per ton *ex* works in bulk.

Pitch continues dull with values nominal at 35s. per ton f.o.b. Glasgow for export, and 35s. per ton *ex* works in bulk for home trade.

Refined tar is moving in substantial quantities with quotations unchanged at about 3d. per gallon *ex* works in buyers' packages.

Creosote oil continues a strong feature with prices steady to firm. B.E.S.A. Specification, 5⅛d. to 5⅜d. per gallon; low gravity, 5¼d. to 5½d. per gallon; and neutral oil, 5¼d. to 5½d. per gallon; all f.o.r. in bulk.

Cresylic acid, while receiving more attention, is still easy in tone. Pale, 97/99%, 1s. 1½d. to 1s. 2½d. per gallon; dark, 97/99%, 1s. to 1s. 0½d. per gallon; and pale, 99/100%, 1s. 2½d. to 1s. 3½d. per gallon; all *ex* works naked.

Crude naphtha is not too plentiful and available supplies are selling at 4½d. to 5d. per gallon.

Solvent naphtha.—90/160 grade is 1s. 3½d. to 1s. 4d. per gallon, and 90/190 heavy naphtha is 10½d. to 11½d. per gallon.

Motor benzole is now quoted in this district at 1s. 3½d. to 1s. 4d. per gallon in bulk at makers' works.

Pyridines.—90/160 grade is 5s. 6d. to 6s. per gallon, and 90/140 grade 6s. to 6s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole	0	9½	to	0	10	per gallon at works
Motor "	1	3	"	1	3½	" " "
90% "	1	4	"	1	4½	" " "
Pure "	1	7½	"	1	8	" " "

Contracts Advertised To-Day

Oils and Greases.

Bradford Gas Committee. [p. 324.]

Pipes.

Bradford Gas Committee. [p. 324.]

Stores.

Bradford Gas Committee. [p. 324.]

Trade Notes

Geared Electric Motor Units.

We have received from the Lancashire Dynamo & Crypto, Ltd., 94, Petty France, Westminster, S.W. 1, a copy of their latest illustrated catalogue describing their geared motor units. They have been manufacturing these units for over 12 years and they are now being used successfully on thousands of various drives in all parts of the world.

Renold Stock Chain Drives.

The price lists operative from Aug. 1, 1935, for Renold and Coventry products for industrial applications and stock chain drives catalogue have been forwarded to us by the Renold and Coventry Chain Company, Ltd., Renold Works, Didsbury, Manchester. Very considerable reductions have been made in the prices of 8 mm. and ⅜ in. pitch chains and stock drives utilizing ⅜ in. and 1 in. pitch chains.

"Wear-Cure" Tablets.

It is generally agreed that the upper piston rings of modern internal combustion engines are somewhat starved of lubrication owing to the action of "scraper" rings. Following the outstanding success that Messrs. Alexander Duckham & Co., Ltd., 16, Cannon Street, E.C. 4, achieved with their wear-preventing Aero W.P. oils, they have evolved what they claim to be an entirely new lubricant (incorporating the same corrosion inhibitor) in a tablet form that is soluble in all standard fuels. While it is essentially a wear-preventing medium throughout the life of the engine, these tablets have a special value during "running-in." Tests carried out by the Institution of Automobile Engineers showed a reduction in wear of over 34% with the use of these tablets.

For increased efficiency in every process related to gas manufacture . . . .

THE WEST SYSTEMS

OF CARBONIZATION, FUEL-HANDLING AND TREATMENT

The West organization has co-operated with leading gas undertakings of 22 countries in schemes of modernization, plant renewal and extension. Most of the world's principal gas coals have been treated in our Research Gas Works

GLOVER-WEST VERTICAL RETORTS

WESTVERTICAL CARBONIZING CHAMBERS

A MEMBER COMPANY OF THE SOCIETY OF BRITISH GAS INDUSTRIES · 1905 ·

BREEZE-BURNING PRODUCERS AND WASTE-HEAT RECOVERY PLANT
MODERN METHODS OF COAL & COKE HANDLING & TREATMENT

WEST'S GAS IMPROVEMENT COMPANY, LTD.
MANCHESTER: ALBION IRONWORKS, MILES PLATTING. LONDON: REGENT HOUSE, KINGSWAY, W.C.2

STOCK AND SHARE LIST

Official Quotations on the London and Provincial Stock Exchanges

Issue. £	Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Aug. 2.	Rise or Fall on Week.	Transactions, Lowest and Highest Prices During the Week.
1,551,868	Stk.	Mar. 11	7	7	Alliance & Dublin Ord. ...	130—140	...	...
374,000	,,	June 24	4	4	Do. 4 p.c. Deb. ...	90—100	...	...
557,655	,,	Feb. 18	7	7	Barnet Ord. 7 p.c.	165—170	...	...
300,030	1	Apl. 8	1/4⅔	1/9⅔	Bombay, Ltd.	1 7/16—1 11/16	...	31/6—32/4½
178,480	Stk.	Feb. 18	9½	9½	Bournemouth sliding scale ...	225—235	...	...
550,050	,,	,,	7	7	Do. 7 p.c. max. ...	168—173	...	...
489,160	,,	,,	6	6	Do. 6 p.c. Pref. ...	149—154	...	...
50,000	,,	June 24	3	3	Do. 3 p.c. Deb. ...	85—90	...	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	106—111	...	108½
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	123—128	...	...
357,900	,,	Feb. 18	7½	7½	Brighton, &c., 6 p.c. Con. ...	173—178	...	176½
649,955	,,	,,	6½	6½	Do. 5 p.c. Con. ...	153—158	...	...
205,500	,,	,,	6	6	Do. 6 p.c. B. Pref.	145—150	...	...
1,487,500	,,	July 8	5	5	Bristol, 5 p.c. max.	120—123*a*	...	...
120,420	,,	June 7	4	4	Do. 1st 4 p.c. Deb. ...	102—104*a*	+1½	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	101—103*a*	+½	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	127—130*a*	...	...
855,000	,,	Mar. 11	7	8	British Ord.	154—159	+1	156½—158½
100,000	,,	June 7	7	7	Do. 7 p.c. Pref.	160—165	...	...
350,000	,,	,,	5½	5½	Do. 5½ p.c. "B" Cum. Pref.	112—117	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	109—114	...	...
200,000	,,	,,	...	17/6	Do. 3½ p.c. Red. Deb. ...	99—101	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1—3	...	...
100,000	10	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1—3	...	...
150,000	Stk.	June 24	4½	4½	Do. 4½ p.c. Deb. ...	83—88	...	...
626,860	,,	July 22	6	6	Cardiff Con. Ord.	127—132*	...	...
237,860	,,	June 7	5	5	Do. 5 p.c. Red. Deb.	107—112	...	...
157,150	,,	Feb. 4	5	6½	Chester 5 p.c. Ord.	111—116*b*	...	...
98,936	1	Mar. 25	2/-	2/-	Colombo, Ltd., Ord.	1⅛—1⅛	...	...
24,500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	20/6—22/6	...	...
609,204	1	Mar. 25	-/11/48	-/11/48	Colonial Gas Assn. Ltd. Ord.	20/6—22/6	...	...
296,053	1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	26/—28/-	...	...
1,775,005	Stk	Feb. 4	5	6	Commercial Ord.	103—108	−1	104—105
620,000	,,	June 7	3	3	Do. 3 p.c. Deb. ...	85—90	...	88½—89
286,344	,,	Feb. 18	5	5	Do. 5 p.c. Deb. ...	123—128	...	...
807,560	,,	Feb. 18	7	7	Croydon sliding scale... ...	155—160	...	...
569,590	,,	,,	5	5	Do. max. div.	115—120	...	...
620,385	,,	June 24	5	5	Do. 5 p.c. Deb.	123—128	...	...
542,270	,,	Feb. 18	7	10	Derby Con.	185—195*c*	...	...
55,000	,,	June 24	4	4	Do. 4 p.c. Deb.	100—105*c*	...	...
239,000	,,	Feb. 4	5	5	East Hull Ord. 5 p.c. ...	108—113	...	...
181,625	,,	Feb. 4	6	6	East Surrey Ord 5 p.c. ...	131—136	...	...
175,609	,,	June 7	5	5	Do. 5 p.c. Deb. ...	123—128	...	...
1,002,180	,,	Mar. 11	†	†7	European, Ltd.	170—180	...	...
19,313,481	,,	Feb. 4	5⅔	5⅔	Gas Light & Coke 4 p.c. Ord.	28/—28 6*f*	...	28/1⅓—28/4½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	89—92	...	90⅔
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	108—111	...	109½—112
8,602,497	,,	June 7	3	3	Do. 3 p.c. Con. Deb. ...	89—92	...	91—92
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	115—118	...	117½—118
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	112—115	...	114—115
270,466	,,	Feb. 18	6	6	Harrogate New Cons. ...	135—140	...	...
140,000	1	Mar. 25	1/7½	1/7½	Hongkong & China, Ltd. ...	1⅛—1⅛	...	...
213,200	Stk.	Feb. 18	6	6	Hornsey Con. 3½ p.c.... ...	128—138	...	136—136½
5,600,000	,,	May 13	10	14	Imperial Continental Cap. ...	215—220	...	215—217
223,130	,,	July 22	3½	3½	Do. 3½ p.c. Red. Debs.	90—95*	...	...
285,242	,,	Feb. 18	8½	8½	Lea Bridge 5 p.c. Ord. ...	175—185	...	...
2,167,410	,,	Feb. 18	6	6	Liverpool 5 p.c. Ord.... ...	139½—141½*b*	+½	...
245,500	,,	June 7	5	5	Do. 5 p.c. Red. Pref. ...	105—110*b*	...	...
306,083	,,	July 8	4	4	Do. 4 p.c. Deb.	103—106*b*	...	...
165,736	,,	Feb. 18	8	10	Maidstone 5 p.c. Cap. ...	185—195	...	...
63,480	,,	June 24	3	3	Do. 3 p.c. Deb. ...	82—87	...	82½—84
75,000	,,	May 27	†10	†10	Malta & Mediterranean ...	212—222	...	...
392,000	—	Apl. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	100—105	...	...
231,978	Stk.	Feb. 4	5	5	M. S. Utility "C" Cons. ...	110—115	...	...
818,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	102—107	...	...
360,075	,,	June 24	4	4	Do. 4 p.c. Deb. ...	103—108	...	...
148,955	,,	,,	5	†5	Do. 5 p.c. Deb. ...	123—128	...	...
125,000	—	July 1	3½	3½	Do. 3½ p.c. Rd. Rg. Bds.	97—100	...	...
675,000	,,	June 24	†13	†13	Montevideo, Ltd.	48—58	...	...
2,081,315	,,	Feb. 18	5	5⅔	Newcastle & Gateshead Con.	25/6—26/6*df*	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	106—107*d*	...	...
776,706	,,	June 7	3½	3½	Do. 3½ p.c. Deb. ...	99—101*d*	...	...
277,285	,,	Oct. 8	5	5	Do. 5 p.c. Deb. '43 ...	105—107*d*	...	...
274,000	,,	Feb. 4	5	5	Newport (Mon.) 5 p.c. max....	115—120*a*	...	...
225,000	,,	Feb. 18	7½	7½	North Middlesex 6 p.c. Con.	165—175	...	170—171½
396,160	,,	Feb. 4	5	5	Northampton 5 p.c. max. ...	107—112	+2	111—112
300,000	,,	Apl. 29	†9	†7	Oriental, Ltd.	168—173	+1	171½—173
416,617	,,	June 7	8	8	Plym'th & Stonehouse 5 p.c.	162—167	...	164—166
504,416	,,	Feb. 4	8	8½	Portsm'th Con. Stk. 4 p.c. Std.	173—178	...	...
241,446	,,	,,	6	5	Do. 5 p.c. max. ...	110—115	...	...
114,000	,,	July 22	5	5	Preston 5 p.c. Pref.	106—111*	...	...
321,961	1	Apl. 8	...	...	Severn Val. Gas Cor. Ld. Ord.	22/—23/-	...	22/9
319,510	1	Mar. 25	...	...	,, ,, 4½ p.c. Cum. Pref.	22/—23/-	...	...
1,736,968	Stk.	Feb. 18	6	6	Sheffield Cons.	141—143*e*	...	...
95,000	,,	June 24	4	4	Do. 4 p.c. Deb.	102—104*e*	...	...
133,201	,,	Feb. 18	8½	5	Shrewsbury 5 p.c. Ord. ...	142—147	...	...
90,000	10	May 27	‡3	‡3½	South African	3—4	...	...
1,061,779	1	May 13	1/2⅔	1/2⅔	South East'n Gas Cn. Ld. Ord.	28/—29/-	+-/6	28/4½
845,016	1	Mar. 11	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	22/6—23/6	+-/3	22/10½—23/1½
450,000	Stk.	Feb. 4	7¼/4	4	Do. 4 p.c. Red. Deb. ...	100—103	...	...
6,709,895	,,	Feb. 4	5	6½	South Met. Ord.	126—130	+1½	126½—129½
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf. ...	147—152	...	...
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf. ...	107—110	...	110½
1,895,445	,,	June 24	3	3	Do. 3 p.c. Deb.	87—90	...	89
1,000,000	,,	July 8	5	5	Do. 5 p.c. Red. Deb....	112—117	...	...
209,820	,,	Feb. 18	8½	8½	South Shields Con.	174—176*d*	...	...
1,543,795	,,	Feb. 18	6	6	South Suburban Ord 5 p.c. ...	130—135	...	133—133½
512,825	,,	,,	5	5	Do. 5 p.c. Pref. ...	121—126	...	...
500,000	,,	,,	4	4	Do. 4 p.c. Pref. ...	105—110	...	...
888,587	,,	June 7	5	5	Do. 5 p.c. Deb. ...	123—128	...	...
250,000	,,	,,	4	4	Do. 4 p.c. Deb. ...	105—110	...	...
647,740	,,	Feb. 4	5	5	Southampt'n Ord. 5 p.c. max.	116—121	...	...
121,275	,,	June 7	4	4	Do. 4 p.c. Deb.	100—105	...	...
350,000	,,	Feb. 4	5½	5½	Swansea 5½ p.c. Red. Pref. ...	115—120	...	...
200,000	,,	June 7	6½	6½	Do. 6½ p.c. Red. Deb. ...	98—103	...	...
1,076,490	,,	Feb. 18	6½	6½	Tottenham and District Ord.	148—153	...	150—152½
409,835	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	131—136	...	...
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	...
334,615	,,	June 7	4	4	Do. 4 p.c. Deb. ...	101—106	...	...
369,774	,,	Feb. 4	7	7	Uxbridge, &c., 5 p.c.	150—155	...	153—155
108,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	118—123	...	...
1,326,700	,,	Feb. 4	7	7	Wandsworth Consolidated ...	157—162	...	159½—161
1,371,373	,,	,,	5	5	Do. 5 p.c. Pref. ...	121—126	...	124
1,317,964	,,	June 7	5	5	Do. 5 p.c. Deb. ...	125—130	...	...
338,300	,,	,,	26/8	4	Do. 4 p.c. Deb. ...	102—107	...	...
158,400	,,	Feb. 18	5	6*g*	Winchester W. & G. 5 p.c. Con.	116—121	...	...

Quotations at :—*a*.—Bristol. *b*.—Liverpool. *c*.—Nottingham. *d*.—Newcastle. *e*.—Sheffield. *f*.—The quotation is per £1 of Stock. *g*.—Paid £3, including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year.

COMPANY NOTICES.

WINCHESTER WATER AND GAS COMPANY.

NOTICE is Hereby Given that the Directors have declared INTERIM HALF-YEARLY DIVIDENDS as follows:—

(*a*) On the Preference Stocks at the rates of £4, £5, and £5 10s. per centum per annum, less Income Tax.

(*b*) On the Consolidated Ordinary Stock at the rate of £5 per centum per annum, less Income Tax.

(*c*) Warrants will be posted on the 31st August, 1935.

The ORDINARY and PREFERENCE STOCK REGISTERS WILL BE CLOSED from the 19th day of August to the 31st day of August, 1935, both days inclusive.

By order of the Board,
W. D. WALKER,
Secretary.

90, High Street,
Winchester,
Aug. 7, 1935.

THE UXBRIDGE, MAIDENHEAD, WYCOMBE, AND DISTRICT GAS COMPANY.

NOTICE is Hereby Given that the TRANSFER BOOKS of this Company so far as they relate to CAPITAL (Ordinary and Preference) STOCKS WILL BE CLOSED from the 17th to the 31st August, 1935, both days inclusive.

By order of the Board,
GEORGE J. BRISTOW,
Secretary.

Aug. 6, 1935.

THE BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is Hereby Given that the TRANSFER BOOKS of this Company relating to ORDINARY STOCK and PREFERENCE STOCK WILL BE CLOSED on the 19th August, 1935, and RE-OPENED on the 2nd September, 1935.

By order of the Board,
E. D. DAVEY,
Secretary.

Offices:
139, Cannon Street,
London, E.C. 4,
Aug. 1, 1935.

THE BRITISH GAS PURIFYING MATERIALS CO. LTD.
LONDON ROAD, LEICESTER.

MODERN PURIFIERS
REQUIRE
EFFICIENT
PURIFYING MATERIALS

ENQUIRIES SOLICITED
SPENT OXIDE WANTED

CAST IRON PIPES
FOR
GAS, WATER, & STEAM
1¼in. to 12in. BORE.

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Bonlea Foundry,
THORNABY-ON-TEES.
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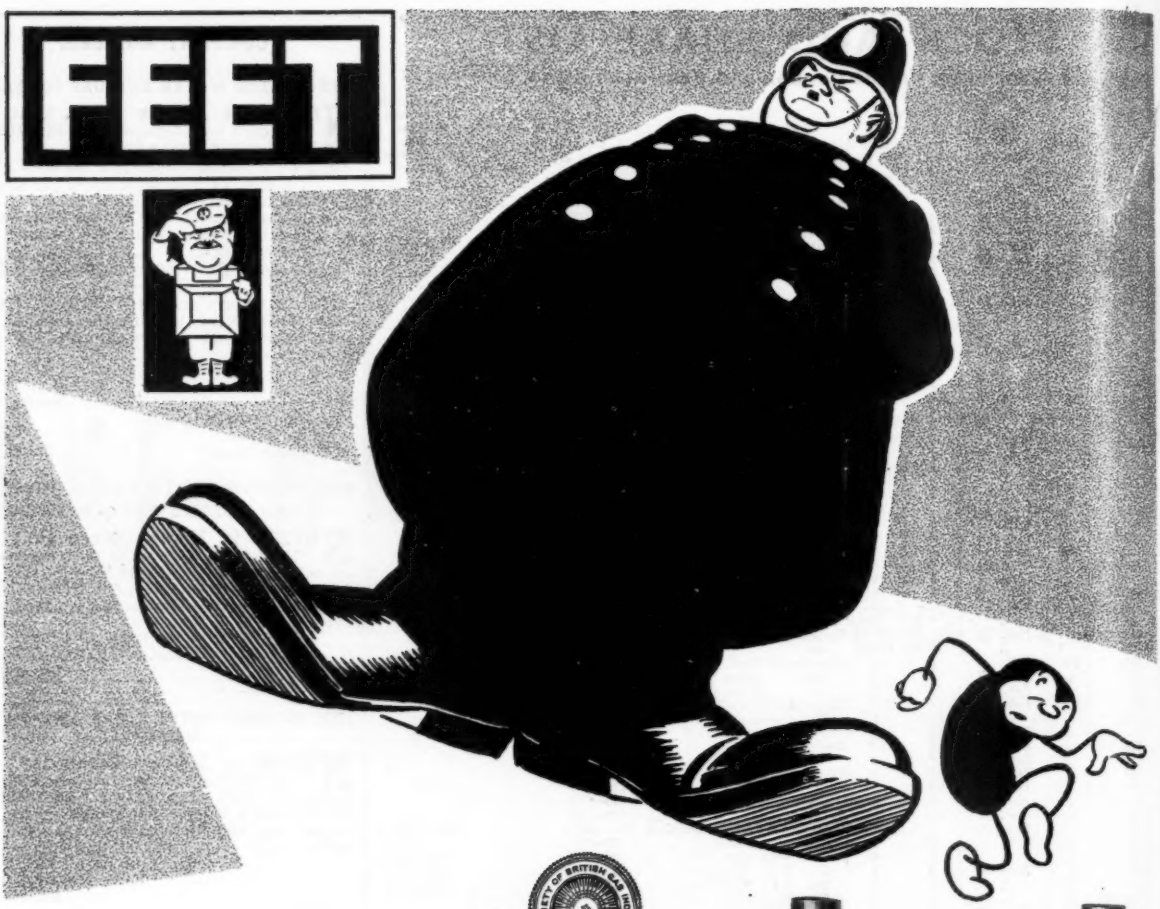
FEET



SAFE SUBSTANTIAL FEET

THE FEET OF THE FORCE YOUR GUARDIANS BY DAY AND NIGHT—LIKE

A & M METERS,

FOR, WHEN IT COMES TO THE MEASUREMENT OF

CUBIC FEET OF GAS, A & M METERS

ARE SAFE.

EDINBURGH, LONDON, BRADFORD & BRANCHES

ALDER & MACKAY LTD.